University of Alberta

Technology in Teaching and Research 2000:
Based on PD, Communication and Support

by

Cheryel Lane Goodale ©

A thesis submitted to the Faculty of Graduate Studies and Research in partial fulfillment
of the requirements for the degree of Doctor of Philosophy

in

Educational Administration and Leadership

Department of Educational Policy Studies

Edmonton, Alberta

Fall 2002

National Library
of Canada

Acquisitions and
Bibliographic Services

395 Wellington Street
Ottawa ON K1A 0N4
Canada

Bibliothèque nationale
du Canada

Acquisitions et
services bibliographiques

395, rue Wellington
Ottawa ON K1A 0N4
Canada

Your file Votre référence

Our file Notre référence

The author has granted a non-exclusive licence allowing the National Library of Canada to reproduce, loan, distribute or sell copies of this thesis in microform, paper or electronic formats.

L'auteur a accordé une licence non exclusive permettant à la Bibliothèque nationale du Canada de reproduire, prêter, distribuer ou vendre des copies de cette thèse sous la forme de microfiche/film, de reproduction sur papier ou sur format électronique.

The author retains ownership of the copyright in this thesis. Neither the thesis nor substantial extracts from it may be printed or otherwise reproduced without the author's permission.

L'auteur conserve la propriété du droit d'auteur qui protège cette thèse. Ni la thèse ni des extraits substantiels de celle-ci ne doivent être imprimés ou autrement reproduits sans son autorisation.

0-612-81194-8

Canada

University of Alberta

Library Release Form

Name of Author: Cheryel Lane Goodale

Title of Thesis: Technology in Teaching and Research 2000: Based on PD, Communication and Support

Degree: Doctor of Philosophy

Year this Degree Granted: 2002

Permission is hereby granted to the University of Alberta library to reproduce single copies of this thesis and to lend or sell such copies for private, scholarly, or scientific research purposes only.

The author reserves all other publication and other rights in association with the copyright in the thesis, and except as herein before provided, neither the thesis nor any substantial portion thereof may be printed or otherwise reproduced in any material form whatever without the author's prior written permission.

Cheryel Goodale

Cheryel Goodale
9627 – 101 Street
Edmonton, Alberta
T5K 0W7

September 26, 2002

University of Alberta

Faculty of Graduate Studies and Research

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled Technology in Teaching and Research 2000: Based on PD, Communication and Support submitted by Cheryel Lane Goodale in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Educational Administration and Leadership.

Dr. David J. Collett

Dr. Mike Andrews

Fern Snart

Dr. Fern D. Snart

Dr. Kenneth L. Ward

Dr. Michael D. Carbonaro

Dr. Terry Evans

September 9, 2002

Dedication

The achievement of this work is dedicated with love to my mother.

Abstract

Educators are interested in the impact of technology on education and are supported by regulatory bodies promoting technology standards, recruiters seeking teachers with technology skills, legislated technology in the curriculum, and a demand for a technology skilled workforce. In response to the interest in technology in education, and faculty members incorporating technology in their work, this study was launched to investigate their professional development needs. This qualitative study selected a convenience sample of 120 faculty and administrators. Using an interview guide, interviewers met with 100 participants. Data was transcribed, and entered into a database for analysis. Findings reported were technology in communication, teaching and research; service to the profession and community; professional development initiatives; infrastructure; and leadership. Concluding statements report that participants use technology in their communication, teaching and research. However many faculty members are not integrating technology in their teaching or assessment strategies, or using technology in instructional management, or in their gathering and analysis in their research. Most faculty members are interested in using the technologies, however they identify time as their greatest barrier. Recognizing that time is also their most valued asset, faculty members look for professional development opportunities designed to meet their needs, from instructors who adhere to andragogical and constructivism principles. Faculty members look to early enablers to share best technology practices. When faculty members see application of technology in their work, they will seek both professional development, and an infrastructure of support. In summary, andragogy, pedagogy and constructivism are theories faculty members want to consider when

incorporating technology in their teaching and in their own learning, and systems theory is relevant to faculty members working with technology in an interdependent infrastructure. To learn about new technologies and best practices, and to work with technologies within an interconnected system, developing relationships and communicating with individuals and groups becomes vital. To continue to be involved with new and evolving technologies in education, faculty members seek leadership and recognition of their role, and faculty members look for dialog with colleagues regarding ethics, legalities, philosophy, and the impact of technology on education, and education's impact on technology.

Acknowledgements

I am grateful for your contributions and support of my passion to pursue knowledge and for my work in this study. Immeasurable thanks to members of my supervisory team for professional guidance, support, and challenges. To the participants in the study, I give thanks for giving of your time, your most valued asset, thank you. Heartfelt thanks to my family and friends for unconditional support and encouragement. You are of utmost importance in my life. It is through all of you that I have found balance between love, and love of learning.

TABLE OF CONTENTS

CHAPTER 1 – OVERVIEW OF STUDY 1

- Introduction 1
- Transition to Using Technology 2
- Problem Statement and Research Questions 3
- Significance of the Study 4
- Rationale 5
  - Systems View—Working Together to Use Technology 5
  - Working with Technologies 7
  - Andragogy, Constructivism 7
  - Assumptions and Expectations to Use Technologies 9
  - Opportunities for Professional Development 10
- Assumptions 12
- Limitations and Delimitations 12
- Research Organization and Method 12
- Definitions 13
- Organization of the Manuscript 14

CHAPTER 2 – LITERATURE REVIEW 15

- Introduction 15
- Systems Theory Relevant to Technologies 16
  - Systems Approach 16
  - Teams 18
  - Technology and Change 19
  - Evaluation 19
  - Systems Summary 20
- Adult Learning and Constructivist Theory 20
  - Andragogy 20
  - Constructivism 21
  - Andragogy and Constructivism 23
    - Critical Thinking 25
    - Communication Collaboration 25
  - Adult Learning and Constructivist Theory Summary 27
- Technology in Research 28
- Professional Development (PD) 30
  - PD Needs – Research 31
  - PD Needs – Constructivist Framework 31
  - PD Needs – Web - Computer Managed Communication / Courses (CMC) 32
  - PD Needs – AV 33
  - PD Needs – Planning, Implementing 34
  - PD Needs – Culture Global Time 36

PD Needs – Ethical Security 37
PD Needs – Evaluation 37
PD Needs – Training 37
PD Needs – Faculty Support 38
PD Needs – Learners Support 39
PD Needs – Competencies 40
PD Needs – Faculty Learning Technologies 41
PD Needs – Educators 43
Professional Development Barriers 44
Professional Development Summary 44
Rationale 45
Summary 45

CHAPTER 3 – RESEARCH ORGANIZATION AND METHOD 50

Introduction 50
Design 50
Interview Method 52
Interviewers 53
Selection of Participants 53
Procedures 54
Interviews 54
Database 56
Analysis 57
Trustworthiness of the Study 57
Method Summary 58

CHAPTER 4 – PRESENTATION OF FINDINGS 60

Introduction to Findings 60
Findings – Application of Technology in Communication, Teaching, Research 61
Introduction to Application of Technology 61
Communication With Technology 62
General Communication 62
Technology to Communicate - Non Course Related Activities 63
Technology to Communicate with Administration 65
Technology to Communicate with Undergraduates - Course Related Activities 66
Technology to Communicate with Graduates - Course/Supervisory Related Activities 67
Technology to Communicate with Colleagues and Professional Contacts 68
Technology to Communicate - Attachments or File Transfer Process 69
Communication Summary 70
Technology in Teaching / Learning 72
Technology in Planning/Design 72

Technology in Teaching 73
Teaching – Technology to Communicate 74
Teaching – Technology in Development, Delivery and Integration 75
Teaching – Technology - Specialized Tools 77
Teaching – Technology - Delivery from a Distance 77
Teaching – Technology - Future 80
Teaching – Technology - Core Technical Skills 81
Teaching – Technology - How to Teach at a Distance 83
Teaching – Technology - Integration / Pedagogical Skills 83
Teaching – Technology - Impact on Society 86
Teaching – Technology - Graduate Students 90
Technology in Teaching Summary 91
Technology in Assessment 92
Technology in Instructional Management 96
Demographics - Teaching 97
Technology in Teaching / Learning Summary 98
Research 99
Type of Research and Use of Technology 99
Searching 101
Gathering 102
Analyzing 104
Writing / Editing 106
Publishing/Disseminating 107
Research Interests 109
Demographics 110
Research Summary 111
Technology 112
Introduction to Technology 112
Websites 112
Electronic Journals 115
Email 116
Using Technology - What Went Well and What Did Not 116
Technology Summary 119
FINDINGS - PROFESSIONAL DEVELOPMENT 120
Introduction to Professional Development 120
Professional Development Opportunities 120
Focus or Vision of Professional Development 120
Self-Directed and Ongoing Professional Development 121
Professional Development – Community / Profession 122
Professional Development – Community 122
Professional Development – Service to the Profession 123
Professional Development – Selecting Opportunities 124
Professional Development Opportunities – Participated In the Past 124
Professional Development Opportunities – Participated Recently 125
Professional Development Opportunities – Participate in the Future “What” 127
Professional Development - How to Learn about Technologies 129

Professional Development Opportunities – Future "How" 132
Professional Development Summary 139
Leading - Infrastructure - Help, Follow-up Help 140
Help – Documentation 140
Help – Community of Learners 141
Help – Hallway Help 143
Help – Help Desk Hotline 144
Help – Registry 145
Help – House Call 145
Infrastructure Service and Support 147
Templates 147
Tools 148
Support 149
Services 150
Support and Services – Recognizing People and Departments 151
Need for Additional Services and Support 154
Need for Additional Services and Support – Suggestions 155
Infrastructure – Summary 157
Leading the Way – Professional Development 157
Leading the Way – Pre-Service and Service Teachers 157
Leading the Way – Faculty Members in the Lead 158
Leading the Way – Technology Specialists 159
Leading the Way – Recognition / Support 159
Leading the Way – Policy 160
Leading the Way – Infrastructure 161
Leading the Way – Infrastructure Suggestions 163
Leading the Way – Time Management 167
Leading the Way – Importance of Issues 172
Infrastructure 172
Need for Discussion 173
Need for discussions 173
Cocooning 173
Topic for discussions 174
Leading the Way – Summary 175
Findings Summary 175

CHAPTER 5 – SUMMARY 179

Review of the Study 179
Introduction 179
Method 180
Summary of Findings 181
Professional Development Support Model Emerges 185
Professional Development, Administration, Application Support, Technology Services 185

Research – Support to Use Technology 186
Teaching Delivery – Support to Use Technology 187
Teaching Integration – Support to Use Technology 188
Theories 190
Systems Theory 191
Constructivism - Andragogy 191
Teaching 191
Learning to Use Technology in Research or Teaching 193
Professional Development 193
Professional Development Cycle 193
Professional Development Beyond 195
Summary Statements 196
Communication 196
Teaching 196
Research 197
Professional Development 198
Infrastructure 199
Leadership 199
Theories 200
Summary of Statements 201
Recommendations 202
Recommendations for Practice 202
Recommendations for Further Research 207
Recommendations Summary 209
Implications 209
Reflections 210
Communication 210
Technology Mediated 210
Technology as Glue 211

REFERENCES 213

APPENDIX A - INTERVIEW GUIDE (EXAMPLE) 224

APPENDIX B - INVITATION/CONSENT FORM (EXAMPLE) 228

LIST OF TABLES

Table 1 General Use of Technology as a Communication Tool 63

Table 2 Communication for Non Course Related Activities 65

Table 3 Communication with Administration... 66

Table 4 Communication for Course Related Activities 67

Table 5 Communication with Graduates... 68

Table 6 Communication with Colleagues and Professional Contacts 69

Table 7 File Transfer Process.. 70

Table 8 Communication - Other Comments 71

Table 9 Planning Using Technologies 73

Table 10 Communication Using Technogies 74

Table 11 Integrating the Technologies.. 76

Table 12 Technology - Integration 77

Table 13 Technology and Distance Delivered Courses - Advice from Participants with Experience 79

Table 14 Technology and Distance Delivered Courses - Concerns.................. 80

Table 15 Future Use of Technology Supplement - Entire Distance Course 81

Table 16 Teaching - Core Technical Skills.. 82

Table 17 How to Teach at a Distance 83

Table 18 Teaching Integration - Pedagogical Skills, General and Specific - Concerns 84

Table 19 Teaching Integration - Pedagogical Skills, General and Specific, Advantages of Promoting 85

Table 20 Impact of Technology - Learning / Teaching 87

Table 21 Impact of Technology Concerning Educators - Philosophy, Policy, Issues 88

Table 22 Impact of Technology Concerning Educators - Society 88

Table 23 Impact of Concerning Educators - Ethifcs / Security 89

Table 24 Graduate Students 90

Table 25 Technology in Assessment - Test development - Management 94

Table 26 Technology in Assessment - Submit Electroniclly Advantages and Concerns 94

Table 27 Technology in Assessment - Intgrate Assessment............................. 95

Table 28 Technology in Assessment - Edit Online... 95

Table 29 Management Concerns and Advantages 97

Table 30 Self-Identified Types of Research... 100

Table 31 Use of Technology in Research 101

Table 32 Use of Technology to Search - Comments that Identify Tools........102

Table 33 Use of Technology to Search - Comments that Identify Use 102

Table 34 Use of Technology to Gathering Data - Comments that Identify Tools 103

Table 35 Use of Technology in Gathering Data - Comments that Identify Use 104

Table 36 Use of Technology in Analysis - Comments that Identify Tools ...105

Table 37 Use of Technology in Analsyis - Comments that Identify Use 105

Table 38 Use of Technology in Writing/Editing - Comments that Identify Use 107

Table 39 Use of Technology in Publishing - Comments that Identify Tools and Use...108

Table 40 Research Technology...110

Table 41 Type of Web Sites...112

Table 42 Use of Web Site - Personal and Course Related Comments 113

Table 43 Use of Web Site - Unit or Department Related Comments............114

Table 44 Technology - What Did Not Work So Well 118

Table 45 Technology - What Works Well 118

Table 46 Use of Technology in Professional Development - Community ...122

Table 47 Use of Technology in Professional Development - Profession 123

Table 48 Participants Learning 125

Table 49 Professional Development Opportunities Involved In 126

Table 50 Future - Research Technology 127

Table 51 Future - Learn about Office Applications 128

Table 52 Future - Communication and Information Processing 128

Table 53 Future - Teaching 129

Table 54 Hear About Technologies 130

Table 55 Marketing / Sales 132

Table 56 Promotion of Emerging Technologies 133

Table 57 Research 134

Table 58 Self-Teaching 134

Table 59 Courses - Logistics 135

Table 60 Courses - Logistics 2 136

Table 61 Courses - Pedagogy / Andragogy 137

Table 62 Relevance of Learning 138

Table 63 Contextual - Apply Learning 138

Table 64 Instructors 139

Table 65 Documentation 141

Table 66 Community of Learners - Contacts 142

Table 67 Community of Learners - Trainers, Specialists 142

Table 68 Hallway Help 143

Table 69 Help - Help Desk Hotline 144

Table 70 Registry 145

Table 71 House Call Help 146

Table 72 Templates and Forms 148

Table 73 Tools 149

Table 74 Support and Services 150

Table 75 Service 151

Table 76 Recognition of People 152

Table 77 Recognition of Support 153

Table 78 Recognitionof Types of Support and Service 153

Table 79 Need for Services/Support 154

Table 80 Need for More Support - Standards 156

Table 81 Need for More Support - Standards 156

Table 82 Leading the Way - Needs of Pre-Service / Service Teachers 158

Table 83 Leading the Way - Technology Specialists 159

Table 84 Leading the Way - Recognition and Support 160

Table 85 Leading the Way - Policy 161

Table 86 Leading the Way - Infrastructure 163

Table 87 Leading the Way - Infrastructure - Suggestions 164

Table 88 Leading the Way - Infrastructure - Suggestions - 2 165

Table 89 Leading the Way - Infrastructure - Suggestions - 3 165

Table 90 Leading the Way - Infrastructure - Suggestions - 4 166

Table 91 Too Little Time 167

Table 92 Equitable Recognition, Time, Funding 168

Table 93 Learning 169

Table 94 Relevance 170

Table 95 Communicating 171

Table 96 Research and Teaching 172

Table 97 Need for Discussion 173

Table 98 Cocooned 174

Table 99 Topic for Discussion 174

LIST OF FIGURES

Figure 1. Professional development process. 3

Figure 2. Summary of findings. 184

Figure 3. Professional development, administration, support and services. 186

Figure 4. Technology in research. 187

Figure 5. Technology in teaching – delivery. 188

Figure 6. Technology in teaching – problem solving, integration. 189

Figure 7. Technology in research and teaching – systems view. 190

Figure 8. Professional development – technology. 194

CHAPTER 1 – OVERVIEW OF STUDY

Introduction

As technologies converge with the field of education, it becomes increasingly apparent that academic educators need to become conversant with the application of technologies in their communications, teaching, and in their research to support both their discipline, and pre-service and in-service teachers. To become conversant with the technologies, educators need opportunities for professional development.

Many educators are using the same technologies to incorporate technology in their traditional campus based courses as the educators who are providing entire courses at a distance independent of space and time. Although reference to the use of technologies in the traditional classroom tends to be distinct from the use of technologies in distance delivered courses, many of the goals, techniques, opportunities for interaction and problem solving, and actual uses of the technologies are beginning to blend or overlap (Rogers, 2001; Welburn, 1996). Whether technology is used to increase opportunity for interaction and problem solving in the traditional classroom or in a distance delivered course, it is only when the technology becomes transparent that the physical distance between teachers and learners becomes insignificant. Bates (1995) values the ability of the educators to use the technologies to not only reach out to learners and broaden their resources, but to simultaneously enhance their own quality of teaching and learning.

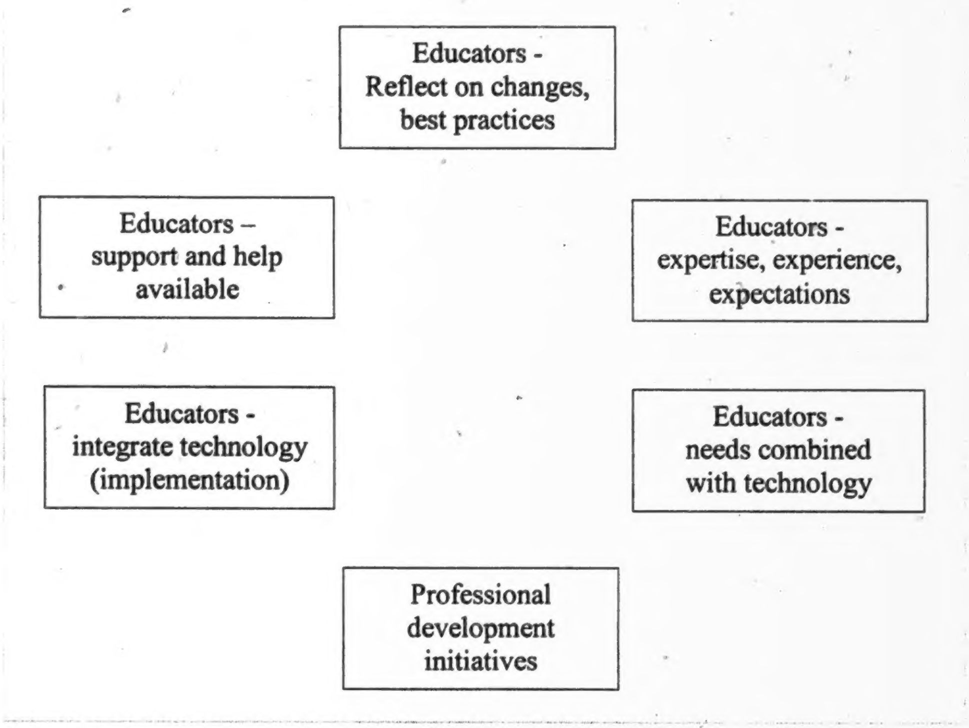
In addition to broadening and deepening their understanding of how technology can be integrated into their courses, it is timely for academic educators to investigate and learn how technological advances can be used in their research. In exploring the implications of technology in the academic profession, Lougee (2001) reports the need for researchers to consider technology in their collaboration among colleagues, scholarly debates, publishing, and rewards for innovation and use of technology. Educators need to learn how technologies can be accessed and used in their searching, gathering, analysis and display of data, and how they can increase their range of professional contacts through electronic communication tools. To maximize the unique features of technologies in their research and teaching, educators need to investigate adapted and different approaches and strategies.

Transition to Using Technology

To move from the traditional to using technologies, educators need the opportunity to learn from the experience of others, and to contribute to and draw from research that strengthens the body of knowledge. To make the transition to using technologies in their teaching and in their research, educators need a vision and opportunities to participate in professional development. Wilson & Berne (1998) conclude from their research that professional development activities can be more successful if educators drive the content and opportunities themselves.

As noted in Figure 1, educators participate in professional development to incorporate technology in their work. Professional development regarding technology is based on the expertise, experience and expectations of the educators. The needs of the educators are investigated, and when determined applicable, merged with relevant technologies. To integrate technology, educators participate in professional development activities and initiatives, ideally driven by educators themselves. Throughout the professional development and incorporation of technology process, educators rely on an ongoing follow-up support system. The educators reflect on the experience and re-enter the process. Educators can be involved in this process for different technologies or applications at the same time.

Figure 1. Professional development process.


Educators - Reflect on changes, best practices
Educators – support and help available
Educators - expertise, experience, expectations
Educators - integrate technology (implementation)
Educators - needs combined with technology
Professional development initiatives

Problem Statement and Research Questions

The accelerated development of technologies and its application to the field of education prompted Olcott & Wright (1995) to present an institutional framework to remind us that we need to renew our commitment to our most important resource—our faculty. As a commitment to our most important resource, the purpose of this study was to investigate the professional development needs of educators with regard to technologies as their self-report, or from their perspective. Through the following two research questions, the study investigated the perceived professional development needs of educators moving from a traditional to technology mediated learning environment integrating technology into teaching, learning, and research:

1. What do faculty members need to make technology an integral part of their teaching process to enhance delivery of instruction, and to facilitate development of knowledge, skills, abilities, including problem solving and critical thinking?
2. What do faculty members need to integrate technology into all aspects of their research process including access to information, collection of data, analysis of data and dissemination of results?

Significance of the Study

As Dutt-Doner, Larson & Broyles (2001) contend that little research is available on how faculty want to participate in professional development opportunities regarding technologies, this study was significant because its findings provided the basis for understanding the basic needs of faculty members and issues integral to the process of integrating technologies in their work. Practical applications and emerging models in the study supported theories relevant to professional development involving technology. This study also impacted groups of people who received information from the study to inform policy and administrative procedures with regard to professional development and technology.

Rationale

To integrate technology in teaching, learning and research, the need arises to investigate the needs of educators making the transition from a traditional to technology mediated environment. Teaching in traditional courses and teaching using technologies are at opposite ends of a continuum with traditional lone educator centered courses at one end and educators working with teams of specialists in a learner-centered technology driven environment at the other. To use technologies in teaching and research, educators are being asked to be cognizant of the transition to working in a team or systems environment, adapting or developing new teaching and learning strategies including principles of andragogy and constructivism, and the need for ongoing professional development with regard to technologies.

Systems View—Working Together to Use Technology

When learning about and using technologies, educators rely on the skills and expertise of many specialists to plan, develop and implement courses and work with the learners. Educators rely on the expertise and support of specialists to provide student, technical, media, instructional, audio, video, or administrative support in an inter-related and interdependent system (Knowlton & Nelson, 2002). Moore (1993), supporting a systems view, challenges educators to move from perceiving instruction as individual work to seeing it as work with a team of specialists—"media specialists, knowledge specialists, instructional design specialists, and learning specialists" (p. 4). A systems view is important for educators to consider because all components are inter-related and interdependent and one change can have rippling effects (Moore & Kearsley, 1997), thus communication skills become critical. From a comprehensive review of the literature, Thach & Murphy (1994) report that educators using technologies require planning, communication and collaboration skills as they work with teams and support groups to develop and implement successful programs. When moving from autonomy and control of the course to a collaborative structure, and when moving from a teacher-centered to a learner-centered system, a skill gap is created for many educators for group dynamics and communication issues in course development and delivery (Thach & Murphy). To best work within the collaborative system, educators need to develop ways of thinking to establish common goals and dedication to action, recognize similar challenges, and value questions for reflection and fresh insights in order for members of the team to become resources to each other (Marquardt & Kearsley, 1999). The decision to teach using technologies involves role diversification, where educators share the role of "decision making during course creation and have a shared responsibility for the final outcome" (Kelly, 1990, p. 79). However, the responsibility for the quality of the teaching and learning and the support of learners often rests with the educators (Olcott & Wright, 1995) and when a number of people are involved in bringing a course to fruition, educators often need to assume responsibility for managing the project. Team leadership demands placed on educators require diverse organizational skills, fostering of a collegial atmosphere, and the establishing of ownership of outcomes and final responsibilities (Kelly, 1990). Educators involved in the research of their subject areas also need to communicate with specialists involved in electronic library or data base storage and retrieval systems. The educators need to learn what and how technological advances can continually enhance their ability to search, collect, analyze and report their data in their related field. To make and maintain contact with professional colleagues locally or globally, or to submit or receive documents, the technologies such as email become vital communication tools. Key to the success of learning and working with the technologies is the ability to work and learn from a network of specialists within a support structure.

Working with Technologies

Working with technologies involves tools, techniques and processes (Alberta Learning, 2001). Alberta Learning's description of technology, based on reviews in the field and extensive consultations with stakeholders, is adopted for this study. Within this study "technology" refers to different pieces of equipment or tools such as electronic computers and calculators. Technology refers to the techniques or ways the technologies are used or manipulated. Technology also refers to the purpose, use or application of the technology (Alberta Learning, 2001). As the study progressed, it became clear to the researchers that most, if not all participants were familiar with the term "technology," and this study's reference to Alberta Learning's description of technology as a tool, technique or process was upheld.

Andragogy, Constructivism

Technology can be used for communication, in research, and in teaching and learning. In teaching and learning strategies, the technologies are best learned in context, and used to support learners involved in interaction and problem solving (Alberta Learning, 2001). To support interaction, relevant content, and problem solving using technologies, attention is drawn to principles of andragogy and pedagogy. Educators working with adults can use the technologies as tools to support critical thinking, interaction, and independent learning that are integral to the theories of andragogy and constructivism (Lane, 1996). Principles of andragogy include the need for facilitated learning in a learner centered environment with regard for individuals and their learning styles, relevant and applicable content, interaction, task oriented exercises and opportunity for self-directed learning without loss of academic rigor. These principles of andragogy are recognized by Boettcher (1999) as key to constructivism. Educators use constructivist principles to teach critical thinking, problem solving, collaboration and communication, and learners use constructivist principles when they apply their learning to their personal experiences and prior knowledge and when they learn to do for themselves (Crawford, 1998). Andragogy and constructivism are strikingly similar in that they both promote relevance of content, participation of learners in the design and implementation stages of the course, self-directedness, facilitated learning and linking of resources to learners, reflection on experience and knowledge, and collaboration or interaction between instructors and learners and among peers to support problem solving and critical thinking. Educators need to learn to work with teams and use the technologies as vehicles for andragogy and constructivist principles to promote communication, interaction, and self-directed learning. Siantz & Pugh (1997) suggest educators need more organization and advance planning skills that will result in interactive activities integrated with the technology to involve students in their own learning. Educators also need to focus on the relevance of their content, their generic and specific skills and knowledge when adapting or developing new and different teaching and learning approaches and strategies to use with the technologies.

Assumptions and Expectations to Use Technologies

It is assumed that the educators have a content base, are experienced with or aware of their audience, and are able to effectively develop plans and deliver the lessons. In addition to assumed skills, educators are expected to have technical skills, adapted or different generic skills, and specific approaches and strategies. Educators using the technologies are asked to investigate new security, ethical, legal, and confidentiality issues; consider cultural and global concerns; gain an understanding of the culture of the learner; develop or adopt ways to humanize the teaching/learning experience; become time aware for both asynchronous and synchronous environments; distribute materials in advance as necessary; and provide support. In addition to these generic skills, educators need to continue to learn specific skills to make the technologies appear transparent. For example, specific to electronic presentation packages, educators need to learn to design and produce presentations and to work with technical people to ensure compatibility when migrating from production to delivery of the presentation. Specific to using the worldwide web and computer conferencing, educators need to manage the learning environment to promote intellectual rigor; respond or write on-line; type and scan; and seek assistance in setting up a balanced view of screens conducive to learning. In addition to managing the learning environment, there is a strong need to develop ways to build, with the learners, an on-line community (Blanchette, Collett, Goodale, Kanuka, 1999). Specific to using audio video conferencing, educators need to learn to work on-camera often without a visible audience, to maintain interaction, and to use a large number of visuals and activities to overcome the conditioning of television and commercials (Blanchette, et al., 1999). If educators are researching theory, curriculum, or their content area, they need to learn to search and filter electronic data bases for information and they need to learn to capture the data, write and print using electronic tools. Evident from the plethora of generic and specific skills and abilities needed to work with technologies, educators need opportunities for professional development.

Opportunities for Professional Development

Educators who are making the transition to electronic search, retrieval and display systems, and analysis programs in their research need opportunities for professional development using the technologies. Educators also need professional development when they incorporate technology in their teaching. Gehlauf, Shatz & Frye (1991) indicate a need for professional development from their survey that reveals a discrepancy between how educators want to teach (interactive methods using the technologies) and how they do teach (traditional lecture approaches using the technologies). Gibson & Nocente (1998) recognize the urgency for professional development for educators to narrow the gap between students' high expectations for educators to be role models using technologies and educators' limited use of technologies as "personal productivity tools" (p. 327). Barker & Dudt (2002) support the need for professional development based on their survey results that indicate instructors perceive they use technology in their classes more than the students perceive the use. Willis (1995) supports Gehlauf et al. suggesting that hands-on training is not only necessary for learners, but critical for educators to deliver successful programs using the technologies. If educators are the key to successful classroom technology integration, then budgets for professional development must keep pace with the expenditure for hardware, software and connectivity (Martin, 2000). Rockwell (1998) and Mandefrot (2001) reveal a strong need to investigate the training needs of educators in areas such as collaboration, teaching/learning strategies, implementation, outcomes, adult education theory, and ways professional development can be implemented.

To implement professional development, participants need to understand the value of participating, have an opportunity to participate in the planning and implementation of a hands-on program with faculty release time, and have an effective teaching evaluation process, support, resources, incentives and recognition systems in place (Rockwell, 1998; Warren, 1999). In addition to formal courses, instructors can improve their use of the technologies, instructional design and concepts of andragogy by learning from others and by learning by themselves (Armstrong, 1998, Armstrong 2000). Morales (1999) and Garrels (1997) suggest workshops and mentors, and Gay (1997) suggests an apprenticeship within a constructivist view to initiate the novice into using the technologies effectively. Professional development can be attained through mentoring, online communications, training, on-line courses, briefings, tours, job rotations, benchmarking, seminars and conferences. Educators can also gain professional development from working with collaborative work teams, developing partnerships, and from interaction with colleagues, administrators, learners, consultants and new hires. Self-directed learning is a choice for educators who assume responsibility for their own learning. Self-directed learning includes options such as the initiative to read, view, listen, reflect, internet surf, and to collect data to learn or monitor trends from sources such as databases of capabilities and interests of colleagues, documented lessons learned, news, policies, products, and processes.

Educators can also focus on hands-on experience using technologies by becoming involved in problem solving, experimenting and demonstrations.

To investigate the professional development needs of educators incorporating technology in their research and teaching, this study was undertaken.

Assumptions

It was assumed that participants in the study provided trustworthy accounts of their understanding of the questions.

Limitations and Delimitations

Limitations or restrictions in the study that were not imposed by the researcher were inherent in the implementation and analysis of the study: The study relied on information gathered through interviews. The study used a convenience sample, thus, findings were context-specific. To remain a manageable process, delimitations or restrictions were deliberately imposed by the researcher: A convenience sample of one faculty of 120 invited participants was used in order for the researchers/interviewers to gain an understanding of the phenomenon under study. Faculty and administrative officers within the University of Alberta, Faculty of Education, were selected for this study because their location and availability was convenient for the researcher / interviewers, yet representative of other faculties and staff. The convenience sample was also conducive to conducting a personal interview with each participant for approximately one hour, within a three month time frame.

Research Organization and Method

A qualitative research method was selected for this study. An interview template was established to guide and focus the interview. After a beta test, the interview guide and procedures were revised. Permission was granted from the faculty to contact faculty members. Invitations were sent to prospective participants asking them to participate in the study. Further contact was made by telephone, email and personal encounters. When meeting with the participants, the participants were asked to sign a release form indicating that the ethics and procedures of the study were understood. The interviews proceeded and results of the interviews on tape were transcribed. The data were transferred to an electronic database format for analysis. After the analysis, the findings and recommendations were developed and recorded.

Definitions

Educators – the term educators is used interchangeably with teacher, instructor, trainer, faculty, faculty members, academic members, and participants.

Distance education – a term used interchangeably with distributed learning, learning at a distance, distance learning, to mean educational content delivered to students who are physically separated from educators and the campus.

Traditional – a term used interchangeably with face-to-face or campus based traditional teaching or learning.

Technology courses – distance courses can be delivered using the technologies and traditional campus based course can also include technologies in its delivery, thus the distinction of needs between the two are becoming blurred.

Early adapters – The term "adapters" is used interchangeably with the term "adopters." Adapters are those who vision and make technology compatible with their needs, and adopters are those who choose to follow a course of action such as adopting a technology tool. Both terms are relevant to individuals who are early users of technology.

Technology - Historically, turning words into text through printing or writing is considered by many as the first form of educational technology (Feenberg, 1999). Currently, this study defines technology as tools, techniques or processes to solve problems and extend human capabilities.

Organization of the Manuscript

Chapter 1 gives an overview of the study including an introduction to the topic, need for the study, background to the problem statements, significance of the study and assumptions.

Chapter 2 is a review of the literature to provide a synthesized yet comprehensive view of studies and theories relevant to the purpose of the study. The review of the literature provides readers with a conceptual framework to understand the study.

Chapter 3 presents the research method, the rationale for the qualitative approach, interview guide design, interview and transcription process, tools and strategies used for analysis, and issues of trustworthiness.

Chapter 4 presents the findings. The findings related to communication, teaching and research are reported in the first section, and findings related to professional development are reported in the second section.

Chapter 5 reviews the research questions and rationale, presents concluding statements, recommendations, and reflections.

CHAPTER 2 – LITERATURE REVIEW

Introduction

The literature review was completed to provide the context of the study to investigate the perceived professional development needs of educators moving from a traditional to technology mediated learning environment integrating technology into teaching and research. The literature review includes system theory, adult learning and constructivist theory, technology in research, professional development needs, and the need for research with regard to the integration of technologies.

Technologies are integrated into business, industry and education and are rapidly changing the way we learn, work, live and think. As technologies open up advanced avenues of communication, and new opportunities for interaction, critical thinking, problem solving and access to resources worldwide, educators need to prepare to explore the resultant impact on their role (Snart, Carbonaro, & Goodale, 2001). Systems theory addresses the need for educators to move from working independently to working in a team environment. Adult learning theory and constructivist theory address the need to incorporate critical thinking, collaboration and communication in the planning, design and delivery of learner-centered courses. Professional development addresses the needs and barriers of educators making the transition to plan, design, develop, deliver, and evaluate courses in technology-mediated environments. To make the transition, educators need to know their role, what is assumed of them, what new skills and knowledge are required and where and how professional development can be obtained. However, educators' needs do not exist in isolation, therefore administrators and learners' needs are also addressed. Technologies are rapidly changing and administrators, educators and learners need to understand any gap between current and expected competencies and attributes. The purpose of the review of the literature is to investigate relevant theory, studies that identify new skills and attributes necessary for educators working in technology-mediated environments, and the incorporation of professional development. This review of the literature develops the rationale and need for this study.

Systems Theory Relevant to Technologies

Systems theory is relevant when working with technologies. To supplement traditional courses or use technology in distance delivered courses, educators need to work with design specialists, resources available electronically, technical support people and people who will support the learners. To participate in professional development opportunities, educators need to know about the technologies, learn to use the technologies from professional development initiatives, and rely on specialists for application and technical support. The systems view must be considered when approaching professional development needs of educators in a technology-mediated environment.

Systems Approach

As technologies provide educational opportunities around the clock and around the world, and as technologies provide new opportunities for critical thinking and communication, the systems approach becomes critical. The systems approach is critical to consider because all components are inter-related and interdependent and if you change one component, it affects others (Moore & Kearsley, 1997). Just as airline pilots rely on the skills and expertise of others for passenger support, security, safety, baggage, airplane production and maintenance, and traffic control in the huge global airline transport and travel industry, so educators need to rely on others, services and systems to implement technology into their traditional and distance delivered programs. Any changes within the educational system can affect other components. For example, changing delivery from one technology to another within a course can change schedules and support systems with other departments and institutions; it can change physical requirements, timing, and costs; enrolment of students; the instructional strategy; and it can change training needs of instructors and learners. When change is introduced in an educational technology system, sub-systems such as course development and delivery, technical and production support systems, and administration must adapt to co-exist (Ramakrishna, 1999). The impact on the system can be enormous. Different from working in an autonomous teacher-learner classroom environment, this inter-related and interdependent system of technology-mediated instruction demands that educators work with other institutions, communication service providers, design groups, and on-site and off-site support systems in a partnering or team environment. Educators also rely on a network of support when they are involved in their own professional development. Knowlton & Nelson (2002) confirm this reliance in their review of educators working collaboratively in a studio setting supported by design and technical specialists. Successful integration of educational technology demands professional development, infrastructure and methodology changes, and stakeholder involvement, as well as a partnering process that encourages planning for coordination and teamwork (Banathy, 1995; Ellsworth, 1997).

Teams

A team approach is necessary in the instructional design and delivery of technology-mediated courses (Knowlton & Nelson, 2002; Maloy & Perry, 1991; Hardy & Olcott, 1995; Thach & Murphy, 1994; Bates, 1996; Moore & Kearsley, 1997). Learning and creating a technology-mediated course requires many different kinds of skills and experience from instructional designers, writers, media specialists, producers, technicians, and support systems. Knowlton & Nelson identify design specialists, support people and colleagues that come together in a professional development environment to design "technology-based solutions" (p.1); Maloy & Perry reveal a need for instructors to work in an interdisciplinary environment; Hardy & Olcott warn instructors of the movement from an autonomy individual (independent) teaching environment to a team approach; and Thach & Murphy challenge everyone involved in distance education to be ready for collaboration, yet respect individual, group and institutional integrity. With an interest in the dynamics of small groups, Bennis (1997) states that "none of us is as smart as all of us" (p. 35) and that we need facilitators or facilitation skills to help us work together to be more productive. Although our communication skills are aided and abetted by technologies such as e-mail, we still need to have empowerment or participative management skills to work with groups (Bennis, 1997). Recognizing that no one knows all of the interesting uses or possibilities of integrating the fast changing technologies with instruction, Knowlton & Nelson (2002), and Bates (1996) suggests educators need to learn to work with teams to develop and deliver a quality learning product and environment to facilitate higher order thinking.

Technology and Change

Russell (1997) asks why so many studies indicate that there is no significant difference in success indicators between technology-mediated and traditional instruction when we know so much about learning and the potential of the technologies. Although we know more about the technologies and learning, we need to consider technology as only one part of the system, interdependent with all other components and stakeholders. Ellsworth (1997) suggests educators need to work with and involve stakeholders and look for opportunities to use the technologies to engage learners in critical thinking rather than rote task performance. For example, by taking advantage of interconnectedness, educators can establish technology links to museums or corporations for realistic simulations, or use the internet to collaborate with authors, peers or specialists from other areas of the world. Bringing technology into a system can affect faculty and students who may feel pressures to change and it can affect a person's personal teaching/learning philosophy as well. Ellsworth challenges educators to incorporate technology in their traditional courses, to address their assumptions, and to take advantage of the technologies and interconnectedness to improve the quality and success of their courses.

Evaluation

Continuous feedback is needed from technologists, specialists, peers and learners to revise and improve the course and delivery. A systems approach is needed to accommodate revisions that are necessary before the course and ongoing throughout the course, revisions that are dependent on the expertise and skills of technologists, specialists and support systems (Sherry, 1996).

Systems Summary

Moore & Kearsley (1997), Ellsworth (1997), and Knowlton & Nelson (2002) challenge educators to think holistically and recognize how complex the technologies in education systems can be. Thach & Murphy ask educators to see themselves as one of the multiple "cogs" in the system, and to see the impossibility for one educator or department to be the experts in all areas of planning and implementing of programs using the technologies. Knowlton & Nelson call our attention to the success of faculty members effectively learning to use the technology supported by a group of people in a studio design. Bates (1996) asks educators to recognize the inter-related interconnected components of the system, and work with specialists and teams to provide teaching learning activities that are integrated with the technology to support a learner centered, problem solving, interactive environment.

Adult Learning and Constructivist Theory

Using technology in education is a way to support critical thinking, interaction and independent learning that are integral to the theories of andragogy and constructivism (Lane, 1996; Martin, 1999; Gagnon & Callay, 2000; Guzman, 2000).

Andragogy

Coined by a German teacher in 1833, reintroduced in Europe in the 1920s but mostly forgotten until Knowles imported and popularized the term in the 1970s, andragogy reflects the growing body of knowledge about adult learners (Lee, 1998). Although Knowles studied andragogy and recognized the need for pedagogy, his focus was always on the learner, recommending the selection of the most effective instruction for the learner and the situation (Lee, 1998). When developmentally appropriate, principles of andragogy can also be applied to younger learners. Principles of andragogy include the need for interaction, task oriented exercises, and self-directedness. Fales & Burge (1984) contend that the design of distance education courses based on adult learning principles encourages learners to be independent and responsible for their own learning without loss of academic rigor. To become a facilitator using adult education principles, educators need to embody a view of "students as adults, whose learning is enhanced when":

> Learning is facilitated rather than subject matter taught; (a) the learning is largely self-planned and self-directed; (b) individual learning styles are respected and used within the course design; (c) the learning is relevant to the individual's personal and professional life situation; (d) collaborative learning interaction among peers is encouraged; (e) resources from the wider environment, such as community and work situation, are used in the learning situation; (f) reflective, experiential and didactic learning strategies are encouraged; (g) and the learning goals include synthesis, evaluation, integration and application of knowledge as well as its acquisition. (p. 69)

The andragogical model of learning fits with technologies that provide the vehicle for two-way communication for instructors to facilitate interaction with and among learners and provide opportunities for self-directed learning (Lane, 1996, King, 2000). Fidishun (2000) argues that integrating technology and adult learning principles with instruction will be more effective as it can provide multiple forms of presentation, multiple paths to reflect learner needs, and multiple modes of interaction, in a learner centered environment. Boettcher (1999) recognizes the principles of Knowles' studies of andragogy as key to constructivism.

Constructivism

As technologies are advancing and providing a vehicle for teaching/learning opportunities such as interaction and communication, problem solving, and virtual learning experiences, either on-line or on-campus, Guzman (1999) suggests the introduction of principles of constructivism. Although different views of constructivism exist, Kanuka (1999) identified the following similarities from a comparison of major positions: New knowledge built on previous knowledge, active learning, the importance of language in learning, and a learner-centered environment. Bruner's constructivist theory is an "active process in which learners construct new ideas or concepts based upon their current/past knowledge" (Kearsley, 2000). Sherry (1996) discusses the symbol-processing or objectivist/behaviorist view where educators transmit their knowledge to students and students recall or regurgitate the information for exams and tests. Situated learning falls within the constructivist view where students actively construct their own knowledge. Within the constructivist view, students learn by interacting with peers, with the instructor and with the content and by building new knowledge on their current knowledge or experiences. The influence of objectivist/behaviorist views is extensive and is ingrained into current teaching and learning methods and assessment throughout educational systems; it is what we have all experienced as learners. However, Crawford (1998) advocates that instructors need to use constructivist approaches to integrate technologies regardless of the traditional behaviorist paradigm. New and seasoned educators need opportunities for professional development to investigate how constructivist principles can be integrated into the teaching/learning experience. Educators use constructivist principles to teach critical thinking, problem solving, collaboration and communication. Learners use constructivist principles to apply their learning to personal experiences and prior knowledge, and to learn to do for themselves. Constructivism also opens up opportunities for students to become skeptic learners (Teaching for Understanding, 1999).

> In life, as in the classroom, each person receives information and looks at it in terms of [their] . . . current understanding. . . .For example, thirty children who hear a reading of a classic fairy tale will emerge with thirty distinct mental images. (p. 3)
>
> The student whose grandfather survived the depression by visiting soup kitchens might well bring an affirming perspective to the social reforms of the 1930s. Constructivists recognize that curricula are not neutral, is not objective; it has a social form and is embedded in the social context from which it emerges. Constructivist curriculum values the scientific method of the traditional disciplines but. . . appropriates the right to subject all texts, recorded and lived, to critical scrutiny. (p. 6)

As places such as museums become reachable through technology such as the internet, Hein's (1991) report on the relationship between museums and constructivist principles becomes important to educators. Hein states that, in addition to being hands-on for viewers, exhibits such as museums also need to become minds-on—viewers need to gain personal meaning by matching up their new knowledge with their experiences. Educators need to consider the opportunities technologies can provide in the areas of relevant content and interaction (Kanuka, 1999). With constructivism, educators need to become more of the learners' "guide on the side" rather than their "sage on the stage" (Taylor, 1997) to develop themes, facilitate interaction, develop content relative to real life experiences, integrate formative assessment, and anchor development and delivery in constructivist theory (p. 14).

Andragogy and Constructivism

There are many similarities between andragogy and constructivism (Lane, 1996; Martin, 1997; Guzman, 1999). Although constructivism traditionally focuses on youth and computer based applications, and andragogy traditionally focuses on adults, reflective thought and social interaction to facilitate discourse and discussion, both principles of andragogy and constructivism place importance on the personal meanings and experiences of learners. "A central theme for creating learning environments within either framework revolves around helping the learners to see and discover themselves as learners" (Martin, 1997). Experiential based learning in constructivism fits with the rich source of life experiences in andragogy, authentic tasks in constructivism fits with adult learners who seek relevance in their learning, and both constructivism and andragogy strive for problem based learning, in a self-directed interactive environment (Guzman, 2000). Like andragogy, instructors using constructivist principles link resources to learners, and provide exercises or projects to encourage self-directed learning. Adult learners arrive in courses ready to be self-directed and responsible for their own learning. Adult learners have a wealth of experience and knowledge, and constructivists would use this experience and knowledge as a foundation for reflection to build new knowledge. Andragogy and constructivism instructors would both use experience and knowledge as rich resources for other learners to draw from. In a collaborative environment, learners would participate in discussions, simulations, field experiences, problem solving exercises, resulting in critical thinking and interaction. Adults are ready to learn but they expect to use the learning to perform a task or solve a problem and they expect the learning to be relevant. Andragogy values adult learning where learners construct their own learning—they are said to learn more permanently and deeply if they are involved. Like andragogy, a constructivist instructor would encourage learners to be involved in the planning, process and evaluation of their courses to ensure relevancy and continuous improvement (Lane, 1996). Lane suggests that educators need to implement andragogy and constructivism principles when they plan, develop and deliver their education courses that incorporate and integrate technology.

Critical Thinking

Educators need to be encouraged and given tools to implement activities to facilitate critical thinking in a constructivist environment (Heinzen & Alberico, 1990; Huff, 1998; Raymond, 1998). Motivated by the necessity for workers to learn problem solving skills in the workplace, Heinzen & Alberico (1990) studied the effectiveness of a teleconference course and found few opportunities for creative thinking and problems solving. However, Huff's (1998) study reveals opportunities for creative thinking and problem solving for remote learners. The learners in the study suggest that they were involved in critical thinking because their teacher used a checklist theorized to measure the teacher's behaviors and techniques, but in a practical way, encouraged them as learners to participate in critical thinking. Anderson & Garrison (1995) conclude from their study of student perceptions of interactive audioconferencing that using the technology does not automatically facilitate a community of inquiry. Opportunities for learners to participate in a community of inquiry, including in-depth discussions, critical thinking, and cooperative problem solving, can only be created if the educator plans and develops checklists or virtual checklists or activities that "capitalize on the interactive potential of the medium" (p. 42).

Communication Collaboration

Collaboration and interaction among students, and between students and the instructor are vital links to constructivism and this "need for interaction is so well documented that it is practically a given" (Hillman, Willis, & Gunawardena, 1994 as cited in Siantz & Pugh, 1997, p. 2; Rogers, 2000). If a critical predictor of learners' motivation or intention to persist is instructor-learner interaction, and if a critical predictor of learners' satisfaction in courses is learners' perception of interaction, then educators using the technologies need the skill to facilitate interaction. The results of Geary's (1998) study that a significant relationship exists between learners' intention to persist and learner-instructor interaction has implications for instructors. It is a strong indicator that interaction strategies need to be implemented to positively influence motivation of learners. From a survey of current practitioners, Kochery (1997) reports the most frequently mentioned training need was for help with facilitating interaction and feedback during interactive television courses. Fulford and Zhang's (1993) theory of cognitive speed helps explain this phenomenon. If people speak at 125-150 words per minute and the mind can process information at twice that rate, then listeners only need to use half their capacity to comprehend. Using their other capacity, listeners are open to outside distractions and internal conversations or "renegade thought patterns." Fulford & Zhang's cognitive theory is important for educators to consider when working with learners in a virtual classroom. Educators need to engage learners (listeners) by involving them in conversations and discussions with the instructor and among other learners and with the content, and by using a variety of hands-on, audio, and visual activities.

Although the findings in Fulford & Zhang's study provides strong evidence to support the need for two-way communication for learners' motivation and satisfaction, they note that it is not always possible. They ask what happens in learning experiences where it is impossible for all learners to interact because of variables such as the class size, time, technology, content, or type of presentation. Fulford & Zhang reference the findings of Kruh & Murphy (1990) and Yarkin-Levin (1983) for answers. The findings suggest that it is the learners' perception of interaction that correlates to satisfaction. The perception of "vicarious interaction" is the interaction that happens internally and silently, where learners respond to questions, agree with answers, and ponder experiences to themselves. Yarkin-Levin provides yet another key—anticipated interaction linked to positive attitudes and recall of facts. When questions and encouragement to answer are thrown around like a ball, learners remain alert because they are not sure where the ball will land. To encourage interaction, Willis (1995) suggests the use of advance organizers, practice sessions using the technologies, electronic journals for feedback, open office hours, management of discussions, and use of on-site facilitators as the instructor's eyes and ears. Willis encourages the use of technologies to provide feedback because learners are motivated to continue with the course if they have frequent contact with the instructor (Willis, 1995). Anderson and Garrison (1995) challenge educators to participate in professional development to learn to implement learning activities that will take advantage of the interactive potential of the technologies. Success of technology-mediated instruction such as teleconferencing and computer conferencing is dependent on the teachers' ability to manage discussions and help learners create knowledge through interaction and critical thinking.

Adult Learning and Constructivist Theory Summary

Principles of andragogy and constructivism can be combined with teaching strategies using technology to support critical thinking, interaction, and independent learning. Challenged to help teachers learn to teach, to ultimately create students who are problem solvers, innovators, and comfortable learning new technologies in a constant world of change, Burgess, Zeitz, & Bin Aris (2002) and Guzman (1999) suggest the merging of andragogy, constructivism and technology in a learner centered environment. Crawford (1998) suggests educators need professional development opportunities to learn to integrate technologies with the principles of andragogy and constructivism in their teaching, and Knowlton & Nelson (2002) suggest principles of andragogy and constructivism are also key to educators when they themselves are involved in professional development.

Technology in Research

Academic members who are involved in research also need to consider professional development as the application of technology in their searching, data gathering, analysis and publication continues to evolve. In electronic searches, academic members need to continuously identify likely sources of information, learn how various search engines work and what they look for, be able to evaluate and filter out what they want, track their sources, share documents electronically, and print and store links or documents in databases (Barry, 1996; Chadwick, 2001). In their gathering, faculty members need to investigate possibilities for online surveys, electronic interviewing or focus groups, collection of data through email (Selwyn & Robson, 1998), collection of data from electronic sources such as medical imaging systems, digital cameras, or collection of data through tele/video conferencing. Businesses are also beginning to offer services to academic members such as the development of electronic questionnaires, or electronic repositories to gather the data

(Tothill et al., 2001). In their analysis, faculty members can investigate the use of word processing, database, and spreadsheet programs, computational analysis programs and text analysis programs for both qualitative research and quantitative research (Peebles, Stewart, Bernbom, McMullen, 2000). For publishing, faculty members can investigate electronic tools to collaborate or co-author with others, and posting to various online websites or journals, or department websites or their own websites (McEldowney, 1995).

When considering using technology in research, academic members need to be aware of issues that arise. Searching using electronic tools and the internet can yield a broader range and type of information, the internet is typically more accessible than a library, and the internet can also provide documents immediately, online or hard copy for the price of printing. However, searching online can be more tedious and less reliable. Searching for information always depends on how well the topic has been narrowed and how relevant the key words are, but the internet does not rely on the same keyword structure or systems as formal libraries or holdings. Academic members need to investigate information to see if information is valid, is sponsored, or is sustainable (will it be available at a later date). Although searching can be quick, searching depends on the expertise of the user and the stability of the technology. When gathering data, data can be analyzed easier if it arrives in electronic format. However, the audience or sample you are trying to reach might not have access to a computer or electronic tools, the setup for data collection might be too technical and require the services of others to maintain, and anonymity and confidentiality issues arise. In analysis, results can be more accurate and faster because it does not have human error or speed as a factor in the process. However, some of the electronic analysis tools can be criticized as being too rigid without regard to details of the data. Publishing on the internet or in electronic media is typically cheaper, faster, and more convenient as you do not need a publishing company as a sponsor, and self-publishing can also reach a wider audience faster. However, not all electronic journals are refereed, not all electronic publishing is located due to the amount of data on the internet, and intellectual property or copyright issues emerge. Given the advantage of using technology in their research, yet the need to be aware of the impact, academic members are encouraged to investigate and critically evaluate the use of technology in their research, and when appropriate, adapt their research skills to working with technology (Schmidt, 1997; Chadwick, 2001).

Professional Development (PD)

Broad & Newstrom (1992) estimate that less than 20% of the content in corporate training is used or applied on the job. Broad & Newstrom's need for more relevant corporate training supports this study's objective to investigate how professional development can assist educators with the use of technology in their work. The identification of participant's needs is critical to the success of training programs to increase the application or transfer of learning from professional development or corporate training to the workplace. Professional development is investigated to explore why educators need professional development when using technologies in their research and teaching, what skills and competencies educators could be involved in, within what support structure, and how educators can be involved.

PD Needs – Research

It is assumed that educators are content experts, are experienced or certified with the age group of the audience, and are able to effectively develop plans and deliver lessons. However, for educators to remain current, deepen and broaden their knowledge of their content area, develop and maintain contact with professionals in their field, and to learn how technology can be integrated in their work, educators need professional development. Professional development opportunities to learn about electronic tools to assist in their research include tutoring or workshops from librarians, best practices from colleagues or graduates, or training from vendors representing the developers of the electronic structure or software used in research.

PD Needs - Constructivist framework

From a Quality Distance Education (QDE) project, and from Schlosser & Anderson (1994), Gay (1997) identifies seven categories of concern to educators within a constructivist framework, and lists skills educators must possess. To work with the technologies, instructors need to be aware of the theory or philosophy of distance education, understand the learners and their remote location, adapt design and develop interactive activities relevant to the technology, provide resources to help students in their independent study; connect students to support services, provide learners with training and practice with the technologies, sustain administrative commitment, become involved in the organization and collaborative planning, evaluate for continuous improvement, and deal with copyright issues. Gay (1997) suggests educators using technologies need training in the form of mentoring from master teachers to implement constructivist principles. To facilitate this learning process, educators using technologies need to know more about the constructivist learning theory, shared expertise with students, teaching strategies for different learners to be working on different projects at the same time, possibilities of instructional strategies using the technologies, electronic ways to accept and deliver assignments, and collaborative ventures including faculties of education, school boards and schools, faculty, researchers, teachers and learners.

PD Needs – Web - Computer Managed Communication / Courses (CMC)

Web sites have the potential to be good resources for educators. Educators need to prepare well in advance to search for and post information on web sites for students, including information such as a course syllabus, biography, course content, guiding questions for readings, and links to resources. Web sites have the potential to be effective communication tools to connect with students and colleagues worldwide. Relevant to web based learning, Berge in Gay (1997) suggests instructors need to pay attention to: humanizing, interaction, and management. To humanize the experience, instructors need to be informal, distribute lists of participants to all students, and be responsive. To facilitate interaction, instructors need to be patient, synchronize and resynchronize, be careful on the amount of instructor contribution, use private e-mail to prompt, and be clear in their communications. To provide management, instructors need to provide procedural leadership, not overload, moderate for tangents and lurkers, encourage student leaders, and end sessions. Educators need to moderate on-line discussions with specific attention to facilitating interaction and group dynamics, setting up group tasks, providing feedback, reflecting on transcripts, becoming role models, reviewing pedagogical demands, providing support and training for learners, and to counting on a longer time period to plan and implement on-line courses. Gay's (1997) discussion of computer conferencing indicates that teachers are expected to learn to become moderators skilled at setting up groups and coordinating and leading discussions to promote intellectual rigor. Educators are also expected to develop social interactions by using introductions, by monitoring the use of humor or sarcasm, and by facilitating interactivity. When teaching through computer conferencing, Berge (1995) clearly states that the teacher's responsibility is to facilitate the discussion. Under the heading of pedagogy, teachers need to learn to encourage student responses to focus the discussion; under social, teachers need to learn to help develop human relationships within the groups; under managerial, teachers need to provide structure and protocol; and under technical, teachers need to make the technology transparent. Instructors and learners need to communicate effectively, be time aware in the timeless asynchronous environment, organized to filter the amount of data that can be posted, technically literate to gain access and manage the physical structure of the conferences, and to cope with on-line social interaction. Writing, typing, scanning and on-line reading skills need to be developed, as well as the ability to switch roles from learner to instructor and from instructor to learner.

PD Needs - AV

From years of experience as a distance educator, Garrels (1997) suggests instructors need training and practice with the nuances of teaching on-camera, organizational and time management skills, facilitation of interaction with and among learners, technical training, and a team approach working with the design and production team. Osborne & Lafuze (1997) see obstacles to interactive video courses as challenges only. For many of the challenges or unanticipated issues, Osborne & Lafuze suggest a collegial sharing for solutions, and therefore they share their trials, tribulations and triumphs with us. They suggest instructors and site coordinators need to learn to read non-verbal signals, encourage participation, humanize the learning experience, develop ways to ask students to relate learning to their own life, deal with confidentiality and security issues, and learn to use the technology. Although not earth shattering information, Osborne and Lafuze would have preferred to have had the opportunity to think about challenges before encountering them. Moving from the traditional classroom to interactive teleconferencing, Cranel (1997) offers instructors practical advice. Instructors need to know that pauses or hesitations in delivery are glaringly apparent on screen, and a variety of visuals and interactive activities are required to compete with the conditioning of television and commercials. Instructors need to be aware of the best way to present visuals, manage time, devise ways to evaluate, develop protocol, and they need to learn to become technical troubleshooters as well as have a contingency plan ready. Cranel also suggests that educators need to provide opportunities for learners to receive training on how to be learners in the video conference environment.

PD Needs – Planning, Implementing

Although good teaching is fundamental to education, Willis (1995) draws our attention to planning and preparation that must be considered when working with the technologies: Instructors need to be well prepared and organized. When working with others in a team environment, visuals, study guides and syllabuses need to be prepared in advance to be made available in advance. Training on technology must be available;

presentations must be interspersed with activities to involve the learner; examples must be relevant; strategies must be in place to gather and give feedback; and every effort needs to be made to humanize the learning experience. Sianz & Pugh (1997) indicate that teachers need organization and advanced planning skills that will result in interactive activities integrated with the technology to involve students in their own learning.

In addition to planning, Rockwell (1998) identifies the need to investigate structure, implementation and outcomes. In planning, educators need to consider collaboration, characteristics of successful distance learners, affects of motivation, potential for problems with access and the technologies, learners' expectations of courses, and reasons why more learners do not enroll. Within the area of structuring, the identification of teaching/learning strategies, support systems, financial resources and faculty time for development and delivery are rated most important. Rating highest in the area of implementation is the identification of incentives and deterrents for learners; the comparison of typical to virtual classroom instruction, reasons why collaborative distance education is successful, how rigor within the course can be maintained, identification of barriers and incentives for the instructor, and factors that encourage team work among instructors and administrators. Under outcomes, effective teacher and evaluation processes are rated as very important as well as the documentation of participation and completion rates of learners. Under general education, educators need to be aware of adult education theory and practice and processes in distance education for educators and learners.

PD Needs - Culture Global Time

Marquardt & Kearsley (1999) state that educators need to know how to integrate/coordinate technologies into their program. Instructors working in a distance education environment need to become aware of the impact when culture and globalization mix with technology and learning. Teachers need to look at the strengths and synergies of each culture. Culture, as described by Marquardt & Kearsley, is how people think, do and live. Thinking includes values and beliefs; doing includes laws, customs, and etiquette; and living is how one interacts with food, clothing, shelter and machines. Considering the learning style of students is the same as considering their culture because learning culture affects learning style. For example, instructors need to be aware of learning cultures if they are introducing inductive problem-solving activities to students who are in or from a culture that predominantly promotes deductive and topic centered reasoning. The length of time and amount of input becomes an issue in computer discussions when students are of a second language or when keyboarding skills are a factor. Different cultures also have preferences for rapid or slower paces to courses. For example, some learning cultures support risk taking activities such as role plays, learning-by-doing, and games, and some cultures do not; and some learning cultures support teacher-centered activities and some cultures prefer learner-centered activities; some cultures prefer to work in teams, and some prefer individual work. Instructors also need to consider culture guidelines when preparing text or visuals. Becoming aware of how others think and operate globally will be critical to expanding education globally in the 21st century.

PD Needs - Ethical Security

Educators using technologies need to investigate issues such as security, ethics, ownership and copyright. Policies need to be investigated continuously as they are altered and developed to accommodate changing patterns in both the access and dissemination of information to protect both the educational institution and property of the teacher (Wolcott, 1993). Other examples are taped session rights and security specific to interactive television, and access rights and security in computer conferencing (Thoms, 1999) .

PD Needs - Evaluation

Regardless of the technologies used, support, planning and evaluation are major issues to be addressed (Institute for Distance Education, 1997). Specific to distance delivery, systems and support must be in place to give students equal and timely access to materials and support in order to participate in class activities and complete assignments. As part of a contingency plan, it is prudent for teachers and learners to keep copies of completed assignments and assume responsibility for the security and storage of assignments while in their hands, and arrange proctor systems if students are required to complete examinations locally.

PD Needs - Training

Distance educators often become better classroom instructors, (Hardy & Olcott, 1995) however, Willis (1995) sees hands on training as critical to their success. The Institute for Distance Education (1997) Models of Education suggests that institutions must investigate training needs for faculty. Faculty need to learn to use the technologies effectively, to participate in up front orientation and training so changes to the course and technologies can be made before the start of the course, and to work with teams of instructional designers, video producers, and other specialists. Of interest to the selection of faculty and professional development, Models of Distance Education (1997) notes that instructors who volunteer for distance education are typically more successful, experience greater satisfaction, and are better at recruiting than faculty who are assigned. Findings based on Gehlauf, Shatz & Frye's (1991) study of faculty perceptions of interactive television indicate that instructors cling to traditional approaches although they believe audio-visual and interactive methods would be more effective. Analyses of the survey results reveal a distinct discrepancy between how the instructor would like to instruct (audio-visual and interactive methods) and how they do instruct (traditional lecture approaches). The instructors in the Gehlauf et al. study indicate a need for training.

Maloy & Perry (1991) send a strong message to educators to acquire skills and expand their vision of "what can be." Findings in Maloy & Perry's study of lessons learned in a teletraining project confirm the need for retraining of instructors including new communication styles and body language, acting skills, subject matter expertise, ability to encourage student interaction through deliberate techniques, and design and delivery of visuals. Wolcott's (1993) study raises the question of who really is in charge of providing training or professional development for the instructors.

PD Needs – Faculty Support

Educators need the support of administration. Educators look to chief academic officers and administrators for a shared vision of technology in education, and leadership that demonstrates their commitment (Szabo, Anderson, Fuch, 1999).

Rockwell's (1998) study reveals a need for administrators to investigate training and professional development addressing such issues as the needs of educators and the need for training, faculty release time for development and delivery of courses, barriers and incentives for the instructor, factors that encourage team work among instructors and administration, effective teacher and evaluation processes, teacher competencies, training on adult education theory, survival in the change process, and reasons for successful distance programs. Administrators also need competencies including general awareness of trends in the industry and emerging technologies; the selection, implementation, support and evaluation of the technologies; and the analysis of cost benefits (Marquardt & Kearsley, 1999). Administrators, researchers and support service managers identify copyright and intellectual property rights, support for learner and professional development for distance educators, quality assurance, and convergence of traditional and distance education as emerging issues affecting distance education (Cegles, 1998).

PD Needs – Learners Support

Although Powers (1997) reflects on courses developed through the internet, the lessons learned are applicable. Powers determined that student success hinges on technical skills; if students' technical skills are not strong, it could jeopardize their academic success. If educators use technologies, it cannot be assumed that students can use them. Training programs need to be in place for students to learn how to use the technologies through workshops or personal "walk throughs," and instructors should synthesize the content with the technology so they could both be learned at the same time in increments. Students should have the opportunity to learn to use the technology and equipment first hand and be updated as the technology matures. The course content and delivery should also be updated as students mature with the technology.

Gay's (1997) review of approaches to teaching and learning activities suggests learners need hands-on training to learn access to the technologies, active learning skills, and to know how to work independently. Closely correlated to student success, Sherry (1996), and Schlosser & Anderson (1994) suggest students need to know how to be testwise, know how to concentrate, and know how to manage their time. Learners need to know problem solving skills for technical problems, how to deal with synchronous and asynchronous timing, how to become an independent learner, and how to communicate with a new technology in a global environment where you need to consider cultures, languages, and use of or perception of humor (Willis, 1995).

PD Needs - Competencies

The American Society for Training and Development's (ASTD) survey results listing technology-based competencies was published by Marquardt & Kearsley (1999). The technology-based competencies include the need to investigate the relevance of technologies to learning styles; the use of electronic text, audio and graphics; and analysis and assessment skills to accurately assess needs and requirements of learners (Marquardt & Kearsley, 1999). Thach & Murphy (1995) describe major skill areas of communication and feedback, interaction, administrative and support services, teamwork or collaboration, technology knowledge and impact on learners. Other skills in Thach & Murphy's literature suggest needs assessment and systems perspective thinking. Blanchette, Collett, Goodale, & Kanuka's (1999) profile on adult educators working in a technology-mediated environment list eleven categories of competencies similar to those of Thach & Murphy including learner support; attention to non instructional activities; technology development and delivery such as work in distance education environment, development of teaching/learning strategies, assessment and individualized activities compatible with the technologies; delivery such as the facilitation or moderation of interactions; needs assessment; and evaluation of courses. The similar findings of Thach & Murphy and Blanchette et al. lend validity to the needs of educators working with technologies to gain an understanding of a systems perspective, principles of andragogy and constructivism, needs assessments, technologies, communication, planning and collaboration.

PD Needs – Faculty Learning Technologies

Dutt-Doner, Larson, & Broyles (2001) suggest that little research is available on how faculty want to learn, however, Callaway, Matthew, & Letendre (2002) contend that faculty learn best in a learning environment based on adult education principles. From experience working with faculty, Cellante (2002) supports adult education principles of faculty being involved in the planning process working from clearly defined goals on technology that will be of value in their work. When distance educators were asked how they learned more about technologies, instructional design, and andragogy and pedagogy without attending formal courses, they said that they learned from other people and they learned by doing (Armstrong, 1998, Armstrong 2000). From years of experience as a distance educator, Garrels (1997) suggests training strategies should include workshops or mentors. Gay (1997) suggests cognitive apprenticeship within a constructivist view to initiate the novice into a community of expert practice. An important part of professional development is to gather expertise electronically from lectures, debates, research and resources. In recommendations for teachers' professional development, Morales (1999) offers practical solutions such as mentoring, collaboration, communication through ministries of education and teachers' web sites, on-line courses, and partnerships with businesses, in-house mentorship with student teachers, and a responsibility for own learning. For professional development to be consistent with constructivist principles, Teaching for Understanding (1996) suggests mentoring, peer coaching, reflective seminars, and collaborative work teams. Marquardt & Kearsley (1999) suggest professional development knowledge can be gained from benchmarking, conferences, consultants, reading, viewing, listening, monitoring trends, collecting data, collaborating, alliances and joint ventures, and from new hires. Knowledge can also be created from problem solving, experimenting, and demonstrations. Once gained, knowledge can be shared by others by a list of capabilities per employee, by documented lessons learned, news, policies, products and processes. Organizations can transfer knowledge through written communications, training, briefings, internal publications, tours, job rotations and mentoring. From a survey of recipients of teacher enhancement grants, Falk, Lochhead, Jacobs & Mooney (1997) report that the major common thread is not areas of expertise, but interest in teacher change, assessment, education reform and professional development. To further professional development, the same group indicates that an electronic site or user group would serve as a good tool to seek information, solutions, findings, successes and failures. Falk et al. (1997) report that of all the topics posted in the study, the discussion about the need for contact after workshops was most successful. Both the posting and just listening participants found the electronic user group to be a useful communication and professional development tool. Pedretti & Woodrow (1999) describe how teachers adopt technology through collaboration, day to day interactions, feedback from students and other teachers, and how teachers are nourished by administrators, parents and co-researchers. Teachers gain valuable information from professional development loops to guide their thinking and inform their decision making. Teachers who act as agents for integrating technology may serve as "powerful vehicles for professional development" themselves (Pedretti & Woodrow, p. 141). As noted, professional development for teachers is eclectic (Falk, et al.), therefore a variety of professional development activities need to be made available.

PD Needs - Educators

Within a distance education environment, Morales' (1999) comparison between goals held by educators for their students' learning and goals held by educators for their own learning is illuminating. Morales reassures us that educators hold shared values to "embolden students to take responsibility for their own learning by instilling interest and avenues to pursue that interest. . . and to ensure their skills for knowledge-building and independence" (p. 1). However, Morales questions if educators apply these same goals to their own learning and if they, as professional educators, are advancing the "efficacy of their own teaching methodology." Morales also asks educators to ponder the following questions:

> Am I an educator taking responsibility for my own learning? Can I advance my knowledge and abilities to empower students to take responsibility for their own learning? How can technology help advance these priorities and implement these strategies? (p.1)

Morales suggests educators need to assume responsibility for their own professional development to integrate technology in their work; and faculties of education, school boards and schools need to collaborate to generate innovative learning opportunities. New teachers and seasoned teachers need to be prepared in the 21st century to help learners learn to problem solve, collaborate and communicate and make a paradigm shift to principles of constructivism. Educators are asked to implement andragogy and constructivism in their own professional development.

Professional Development Barriers

Barriers to professional development are well documented in the literature. Finding time to learn or participate in learning and curriculum development activities involving technologies is extremely difficult for faculty members to allocate. At many institutions research is supported and rewarded, but time, funding and both financial and professional recognition for learning to teach with technologies is not. Traditional higher educational institutions do not have incentives to encourage educators to become involved with the technologies. From an investigation of what faculty members want, Chizmar & Williams (2001) identify lack of release time and lack of rewards as barriers to their participation. As part of the solution, Chizmar and Williams recommend an incentive structure to provide release time and recognition including salary, promotion, and credit in the tenure process.

Professional Development Summary

Educators need professional development when incorporating technologies in their research and teaching to learn or enhance their skills and competencies using the technologies. Educators can be involved in professional development in many ways, but to be effective, the content needs to be relevant, the delivery must adhere to adult education principles and they must learn within a support structure. As time is identified as a barrier to participation, incentives such as release time and recognition for learning and using technology is recommended.

Rationale

Rogers (2000) contends that institutions need to assist faculty with their professional development of technologies. The urgency arises out of the need for institutions to remain competitive and to meet the pressures from governments and accreditation bodies that are implementing technology competencies and standards for both educators and learners. Rogers recommends support for educators to have access to professional development involving technologies to learn about emerging trends, and the impact on learning and examples of best practices. Pedretti & Woodrow (1999) support teams of teachers, researchers and technologists working together to generate "powerful educational environments where innovation and enduring professional development" can flourish (p. 142). Teachers, researchers and technologists can learn from one another, and from studies such as this designed to assist and inform others who are interested in learning from professional development models. Embarking on a teaching by technology course can "intimidate even the most intrepid," therefore links to research where you can learn from other's personal trials and tribulations are recommended (Sheldon & Lawrence, 1997, p. 1) that allows educators to be "forewarned and forearmed" (Osborne & Lafuze, 1997, p. 1).

Summary

Technologies that make educational opportunities available around the clock and around the globe have tremendous implications for technical, human, and physical support to plan, develop, deliver and evaluate technology-mediated courses.

Technologies make educational opportunities available, but the industry is in such a constant state of flux because of new and emerging technologies, that for educators in the 21st century, learning never ends. When making the transition to technology-mediated instruction, the systems approach is critical for educators to understand because technologies in education exist in an inter-related and interdependent environment (Moore & Kearsley, 1997) where changes affect other components or systems. Educators need to understand the systems view and the need for teamwork in the planning, development, delivery and evaluation of courses because it means working with teams of specialists, technicians, communication providers, and support systems (Bates, 1996; Hardy & Olcott, 1995; Maloy & Perry, 1991; Moore & Kearsley, 1997; Thach & Murphy, 1994).

Lane suggests that educators need to implement andragogy and constructivism in their planning, developing and delivering of distance educational programs for learners and in their own professional development. The andragogy and constructivism models fit with the technologies where two-way communication or interaction can be established to develop critical thinking in a collaborative working environment, yet provide opportunity for learners to assume responsibility for their own independent learning. Boettcher (1999) recognizes the principles of Knowles' studies of andragogy as similar to principles of constructivism. The comparison parallels Ellsworth's (1997) vision of Reigeluth's (1994) changes to the educational system, changes to continuous progress, outcome-based learning, new ways of testing, personal learning plans, cooperative learning, learning centers, teachers as coaches and facilitators of creative thinking, problem-solving and meaning-making activities, communication skills, and technology as communication and information tools.

Broad & Newstrom (1992) estimate that less than 20% of the content in corporate training is used or applied to the job. This supports the need to investigate the gap between what the learner knows and what the learner wants to learn to apply in the workplace. Experienced educators and researchers in the literature reveal the following professional development needs instructors may need to make the transition to technology-mediated instruction:

1. advance planning; strong organizational skills;
2. training of both learners and instructors;
3. adult education and constructivist principles and methods;
4. new and adapted teaching/learning strategies, theory, time awareness, and review of pedagogy;
5. facilitation of on-line or on-camera interaction/discussions for academic rigor and community building;
6. scanning, writing, filtering, reflecting on transcripts in web base deliveries, on camera, design, and visual skills in teleconferencing;
7. feedback loops;
8. humanizing of virtual experience;
9. creative ways to evaluate and complete assessments using the technologies;
10. evaluation of learners, instructors, instructional process, technologies, attrition rate;
11. evaluation for course improvement during and at end of course;

12. policies and procedures for confidentiality, ethics, security and copyright;
13. instructor incentives;
14. analysis of learners' technical skills, culture, learning style, facilities, equipment, and support;
15. management and leadership skills for working on teams;
16. procedures, protocol, and role modeling with learners; and
17. support systems for learners and instructors.

To make the transition to working in a technology-mediated environment, educators need to know assumptions made of them, and what skills and knowledge they might require to work with administrators, specialists, and communication and support systems. Although knowing learners' needs is key to success, educators need to challenge assumptions and rethink about teaching and learning (Ellsworth, 1997). When implementing technology in their research, academic members need to participate in professional development opportunities from self-learning to learning in a workshop environment to blend their research skills with the use of technology (Schmidt, 1997; Chadwick, 2001). Researchers and educators in the literature suggest strategies for professional development:

1. Independent learning by reflecting, collecting data, problem solving, hands-on experimenting, reading, viewing, listening, monitoring trends and paying attention to news, policies, products, processes, websites, and briefings.
2. Collaborative learning by casually learning from others, mentorship, apprenticeship, job rotation, from lessons learned from others, tours, and feedback.

3. Formal learning through on-line courses, training sessions, workshops, seminars, and conferences.
4. Learning can also be facilitated through partnerships, alliances and ventures with business, industry and institutions willing to share expertise, skills and resources.

The variety of learning strategies suggested by researchers and educators reflect how instructors choose to teach and also how they choose to learn (Morales, 1999; Rogers, 2000).

This literature review explored systems theory, andragogy and constructivist principles when integrating technology in teaching, the use of technology in research, professional development needs of educators incorporating technology in their work, and the need for this study. This study used a qualitative research method.

CHAPTER 3 – RESEARCH ORGANIZATION AND METHOD

Introduction

The qualitative research method used in this study is outlined under the following subsections; Design, Participants, and Procedures. The method is described in sufficient detail to demonstrate how the qualitative method was conducive to the research questions and to the study, and to provide steps for conducting the research—of value to the reader to follow and for other researchers to use for replication. Details of the method are included to convey how the research was conducted, how the process adhered to professional guidelines, and how the research design met the goals of the study. Cognizant of the need for dependability or ability for others to replicate or adapt the study under similar conditions, documentation of the design, sampling, interview, interview guide, transcribing, and analysis processes are included.

Design

This study utilized a qualitative research design. The qualitative research design was selected as it was considered well suited to the problem or phenomenon under study, and the intended audience. The purpose of this study, to probe for deeper understanding of the professional development needs of educators using technologies, made use of the strengths of qualitative methods to seek illumination, understanding and extrapolation to similar situations (Hoepfl, 1997). Johnson (1995) supported the qualitative research method for educators to "probe for deeper understanding rather than examining surface features" (p. 2) of factors that support learning and teaching. Similarly, Armstrong (2002) selected a qualitative method including interviews to investigate and explore influences that motivate faculty to incorporate technology with their instruction. Armstrong indicated the qualitative method sought to gain a richer understanding of the experiences of faculty members, thus contributing to the body of literature weak in linkages between faculty members as adult learners and their professional development with regard to technology. The qualitative method was also recommended for technology related studies—to investigate the adoption or integration of technologies in education, case studies and shared stories to determine professional development needs (Norum, 1997; Pedretti & Woodrow, 1999). A qualitative approach was selected by the researcher because the method fit the purpose of the research questions, and because the method was supported by research in the field of education, in technology, and by researchers involved in similar studies.

The use of interviews in the qualitative approach was considered as the study involved technologies that are diverse and continuously evolving. During the data collection process, the interviewer could use examples and probing questions to communicate the need for participants to respond about the use of technologies in their own work, not necessarily the use of computers. The technical vocabulary could be explained, examples could be given for clarification, and questions could be answered by the interviewer. The interviewer could observe and perceive if the participants were understanding the technology questions or in need of clarification, and the interviewer could ask for clarification of responses. The interviewer could strive to make the participants feel comfortable in responding to open questions to provide additional information and issues of value or of concern to them—responses the data collection designers and interviewers could not have elicited as they would not have known what questions to ask. Interviews were also deemed appropriate as it was estimated that it would be more time effective for participants to verbally respond than to compose written answers. Interviews as a means to collect data from participants were proposed.

Interview Method

The interview method was selected to capture an in-depth view from participants at a specific point in time in this study. The interview method was supported by (Hoepfl, 1997) as a communication tool whereby interviewers could perceive non-verbal cues, focus on research questions, ask for clarification, yet allow participants opportunity to expand on their responses. For the interview, an interview guide was developed. In addition to using the literature review to investigate and explore existing work and issues in the topic area, the literature review was also used as a source of data to help determine interview questions. The interview guide was also based on input from three faculty members who were familiar with people and technology within the faculty. An interview beta test or pretest was established to give the interviewers opportunity for practice interviewing, to test the interview guide, and to test the interview process. The beta test participants were selected if they had similar responsibilities and background to the sampling group but who would not be involved in the study. Part of the beta test process was the opportunity for interviewers to revise the interview guide. The beta test lent itself to the question of credibility or ability of the interview process to gain the perspectives of the participants. The beta test provided opportunity for edits, and revisions to the interview guide and interview process. The researcher and interviewers met periodically during the interview process to ascertain if the interview process and interview guide needed refining or were remaining a process to measure what it was purported to measure. No major revisions were necessary as the interview guide and interview process gathered information it was intended to gather.

Interviewers

The interviewers in the study included the researcher. The researcher was aware that not only the participants in the study would respond with influences from their social, cultural and educational backgrounds, but the interviewers would also bring their own backgrounds to the study. The researcher and the other interviewers were therefore asked to be aware of any personal perspectives or values brought to the study. All interviewers had previous experience in researching and interviewing, were involved in the integration of technology in education, and were in the process of individually completing their doctoral studies at the University of Alberta. Interviewers were asked to read and endorse the ethical conditions of the study. The interviewers had opportunity to practice their communication and interviewing skills and test out the interview guide in a beta interview test, and have input into revisions to the guide and the process. Interviewers were able to communicate electronically with each other throughout the data gathering process.

Selection of Participants

Convenience sampling was used to select participants deemed by the researcher to be available and accessible and the most likely to provide the best information critical to the research topic, and representative of other faculties of education. The invitation to participate was sent to all 120 members and administrators involved with the faculty of education from one university at the time of the study. The faculty members were from the University of Alberta, Edmonton, Alberta, Canada. This nonrandom procedure was best described as a convenience sample. Although convenience sampling can be limited to the perceptions of the participants, inviting all faculty members and administrators provided maximum variation and breadth across departments, subject areas, skills, fields of expertise, and positions.

Procedures

Interviews

Interviews were scheduled over a three-month time span to avoid changes in data and circumstances over time, to schedule the greatest number of participants with the least number of interviewers, and to allow for participants' previous commitments. Personal interviews were semi-structured using an interview guide.

The interview guide was developed based on the literature and input of the interviewers, and edits from the beta test. The interview guide was used to assist with the gathering of comprehensive information into the same topics for each participant, to keep the interview focused, and to make good use of both the interviewer and participant's time. The interview guide included topics of technology in communications, teaching, research, and professional development, future needs, deterrents, and demographics. The technology in communication topic included communication with students, administrators, colleagues and other professional contacts. The teaching topic included technology in planning, designing, teaching/learning, assessment, instructional management, supplementing or delivering entire courses electronically, and the teaching of technology content. The technology in research topic included types of research, searching, gathering, analyzing, writing and publishing. The professional development topic focused on technology in the community and in professional development. The future of technology, deterrents to using technology, and needs of the participants were also included. Open ended questions for comments were combined with each topic, and a final open ended question at the end of the interview was included to ask participants if there was anything that was not included in the interview that they would like added. Opportunity was made for participants to add comments or concerns of their choice. The interview guide was not intended to restrict the participants input, but as Booth, Columb and Williams (1995) recognize, it was intended for the interviewer to be prepared and consistent.

An application for ethical review was submitted to the University of Alberta and approval was granted before the study was launched. A request was made to the office of the dean of education to gain access to the population. The dean of the faculty chose to describe the study to faculty members and administrators through an announcement letter. A typed invitation from the researcher was then sent through the mail to each invitee requesting volunteer participation in the study. The invitation outlined details of the study and included a release form. The interviewers contacted invitees by e-mail, telephone and through personal encounters to arrange personal interviews. Interviews were conducted in the participant's office or area suggested by the participant as conducive to the interview. The invitation indicated the purpose of the study, information about the interviewers, anticipated time required, need for a signed release to participate in the study, ethical considerations, security and use of recording devices and transcription. The invitation doubled as a release form. Before the interview began, participants were asked to sign the invitation / release form confirming that they understood the ethics, security, confidentiality, hazards, ownership, use of recorders and transcription services, use of data, and voluntary right of refusal and withdrawal. With a signed release form and verbal permission to use a tape recorder, the interview began. Ethics were observed, permission from participants was obtained, and confidentiality in the data was considered by assigning numbers rather than names. Interviewers wrote their own notes on the interview guide, used the guide to track questions answered, and to track topics or questions the interviewer might have wanted to return to or focus on. Hoepfl (1997) supports the use of a recorder as an indispensable tool to capture the data, and the least intrusive tool to allow the interviewer to focus on the interview rather than on note taking. The recorded data were then compiled for transcription and analysis.

Database

Cognizant of the need for dependability or ability for others to replicate this study under similar conditions, the analysis process was documented. In preparation for analysis, the tapes of the interviews were transcribed and information from interview notes were added. A coding system was developed to organize the data by fields or categories, and important to confidentiality, the names of the participants were replaced with numbers. To promote credibility of the analysis, the researcher developed an electronic database to record interview datum. The interviewers met to review preliminary fields or categories, and revisions were made as necessary to the database structure. To prepare for analysis, each set of interview data was entered as a record into the data base.

Analysis

To begin the analysis, the researcher looked for similarities and differences, and identified themes that appeared to be emerging out of the data. The next stage of analysis was a re-examination of the data in the database to look for any comparisons and combinations to acquire understandings and new understandings of the phenomenon under study. Findings were compiled and presented to one of the other interviewers to verify that the themes, practical applications, support structures, and theories arising from close readings of the data were valid or in need of changes. A conceptual framework with supporting interpretation was developed. Findings were reported using direct quotations, tables and figures for reference. Sufficient information was provided for the reader to determine if the findings were applicable to other situations or as a guide to the future.

Trustworthiness of the Study

Trustworthiness was addressed in the study. Trustworthiness in a qualitative study includes auditability or replication of the study under similar circumstances, credibility of the study, and fittingness or generalizability of the findings.

With regard to auditability, interviewers taped each interview and interviewers wrote their field notes on an interview guide for each participant. In the data analysis, themes arising and the research questions drove the continuous emerging fields or categories in the database. Once the interview transcripts and interviewer notes were transcribed into electronic format, close reading and rereading led the researcher to cut and paste each participant's datum into the database categories. Each participant's data became a record in the database. As a matrix, the columns became the categories or fields, and the rows became individual participant's records of information. The coherent database of condensed datum was stored for sorting and analysis and the transcripts and interviewers' notes in electronic format were available for reference.

To support credibility, interviewers allowed ample time in the interview for participants to respond, used open questions at the end of each section of the interview, and provided an opportunity for the participant to add details or new topics at the end of interview. To reduce researcher subjectivity, outlined by Rudestam & Newton (1992) as the values, expectations and assumptions researchers bring to studies, several procedures were used. Multiple interviewers were used to meet with participants, audio tapes captured the interviews for transcription, interviewer field notes were included in the database, interviewers met to edit and revise the interview guide after the beta test, and interviewers debriefed about the interview process and data analysis.

Delimitations or limitations on the study imposed by the researcher or research design include the deliberate selection of participants as being faculty or administrators of the faculty of education, available to invite, accessible, and appropriate to the study, and the deliberate selection of multiple interviewers including the researcher. A limitation over which the researcher had no control was the number of participants to volunteer after invitations were sent out. With regard to fittingness, the researcher is aware of the need to be cautious and modest in generalizing the findings of the study.

Method Summary

A qualitative approach using interviews was implemented in this study. To support the generalizability of findings from the convenience sampling, the researcher in this qualitative study made every effort as a professional to be thorough and neutral in the design and revision of the interview guide to reflect the research questions, and in the implementation and management of the interview process, the transcription, the compiling of data process, the analysis, and in the reporting of the findings, discussion and recommendations. The choice of interviews and the qualitative method used in this study is supported by Hoepfl (1997) as an approach conducive to probing for an understanding of the professional development needs of educators learning to use technologies in their work.

CHAPTER 4 – PRESENTATION OF FINDINGS

Introduction to Findings

The purpose of this chapter is only to provide a summary of information obtained from participants in the study. The study investigated the participants' perceived professional development needs with regard to technology. The participants were from the population of the entire faculty and administrators of the faculty of education from one university. From the 120 invited faculty members and administrators representing all departments within the faculty of education, 42 female and 58 male invitees participated. Of the 20 who did not participate, two suggested a conflict of interest, 6 were out of the city or on sabbatical, and 12 either said no or did not respond.

After signing a release form that outlined the ethical and confidentiality procedures and right to refrain from participation, the 100 participants were interviewed by a team of three graduate researchers. The interviewers used an interview guide with the following major topics: communication, teaching and learning, research, professional development, and an open topic for other responses. The 100 participants reported on their use of technology in their work, and their needs and concerns integrating technology in their communication, teaching and learning, and in their research. Interviews were audio taped and transcribed and combined with interviewer field notes for each participant. Transcripts of data were analyzed and emerging categories were established as 102 fields in a database for the entry of records from the 100 participants. Entries cut from transcripts and pasted in the database included a variety of short answers, key words and enough data from transcripts to understand the entry in context. Queries to the database were established, and reports were run and analyzed. Within each category or field in the database, each faculty member participant (participant) in the study was assigned a database number to maintain confidentiality of names. When the findings reference a participant or participant's comments, the database number is recorded in parentheses. While analyzing the datum, themes arose and those themes were confirmed by the researcher interviewer with one of the other interviewers. When participants were asked about using technology, not computers, in their normal workday, participants primarily related technology and their responses to computers.

For clarity and organization of the data from 100 participants, the analysis of findings are reported under the following two sections: The Application of Technology section includes technology in communications, teaching, and research, and the Professional Development section includes work in the community and profession, infrastructure, and an open area for discussions.

Findings – Application of Technology in Communication, Teaching, Research

Introduction to Application of Technology

The Application of Technology section of the findings report on the perceived professional development needs of educators in reference to the following two research questions: What do faculty members need to make technology an integral part of their teaching process to enhance delivery of instruction, and to facilitate development of knowledge, skills, abilities, including problem solving and critical thinking? What do faculty members need to integrate technology into all aspects of their research process including access to information, collection of data, analysis of data and dissemination of results?

The Application of Technology section includes topics of communication, teaching, research and technology. Each table within the topics is preceded by a description of the comments. When quotes from participants are used, they are used as clarification.

Communication With Technology

When participants were asked about communication, their major focus was on the computer and email as a communication tool. All participants (100%) talked about email. Participants also mentioned telephone or cell phone (16%), voice mail (15%), fax (8%), websites (7%), text telephone system for deaf or hard of hearing people (TTY) (1%), electronic meeting makers (1%), video/audio conferencing (2%), and the need for face-to-face meetings (8%).

With regard to communication, participants were asked to think about the use they presently make of technology in communication with students regarding non-course related activities, with administrative staff, with students regarding course related activities, with graduate students, and with colleagues or professional contacts. Participants were asked if they, at least once, used an electronic file transfer process. Participants were also invited to contribute additional comments.

General Communication

Participants are using email. As indicated in Table 1, participants are using email for general communication. Of the 100 participants interviewed, almost all of the participants (92%) indicate they use email to communicate with students for non course related activities, and all (100%) participants indicate they use email to communicate regarding administration. Most participants (94%) indicate they have used an attachment or file transfer process at least once.

As indicated in Table 1, participants are using email for communication regarding course related activities. Of the 100 participants interviewed, a high number (91%) indicate they use email to communicate with students for course related activities, and most participants (94%) use email to communicate with graduate students. As indicated in Table 1, all participants are using email to communicate with colleagues or professional contacts. Participants are using email in their general communication, in their communication with undergraduate and graduate students, and with colleagues with regard to their research and areas of interest.

Table 1

General Use of Technology as a Communication Tool

N=100	Participants using Technology to Communicate
92	Students regarding non-course related activities
100	Administrative staff
94	Attachment or file transfer process
91	Course related activities
94	Graduate students
100	Colleagues and professional contacts

Technology to Communicate - Non Course Related Activities

Most participants (92%) use email to communicate with students regarding non-course related activities. As noted in Table 2, technology has changed the way faculty communicate. The number of email requests for information has increased, the time it takes to answer email is continuously increasing, and people are demanding immediate responses. Participants note that their email addresses are being obtained from a variety of sources such as university websites, from their publications, from the literature, and from other colleagues worldwide.

As noted in Table 2, participants are responding to inquiries from students all over the world, including former students, prospective students and students from other colleges and universities. Participants are responding to requests for information about their area of expertise and research, requests to preview student resumes, proposals and research, and to requests for letters of reference, interview tips and information about career or educational opportunities. Many requests are received for information about the university, programs and courses. Participants note that they are providing marketing information through email responses. "We get emails like crazy requesting information" (database participant #50) and "students are shopping for universities, searching for program descriptions, and making decisions on what they see on our website, and from our responses" (61). Although technology has increased the volume of communications that in turn places a stronger demand on participants' time and commitment to immediate replies, most participants (92%) recognize the importance of communicating and are striving to respond. However, to meet the challenge to respond to requests electronically, participants suggest administration could assume more responsibility for making information available. Participants suggest they need a repository of drafts, templates, forms and marketing data to draw information from to formulate their responses, and a website to communicate from the faculty or department to the many inquiries from prospective or interested students who have internet access (50, 30, 61, 65).

Table 2

Communication for Non Course Related Activities – (92%)

Advantages	Concerns
Communicate with former and prospective students, local and international (3) (17). Give interview tips (71). Provide social, program inquiries (18). Review resumes, reference letters (16) (8).	Get emails like crazy requesting information. Everyone gets bombarded (50). People expect a very rapid response (23). Need website one to many (61). Information in a central place—servers (30). Register and advise students online (65). Opens up communication that might have died (former students)–changed nature of interaction (17).

Technology to Communicate with Administration

In addition to seeing administration as a resource for information to communicate with former and prospective students, participants also note that email is their direct connection with administration. "Email and list serves are our internal network" (65).

All participants (100%) use email in their communication regarding administration. As noted in Table 3, participants see the advantages of email and list serves to communicate with administration and they also see disadvantages. Some participants critique email as a push of information from administration rather than a pull of information from the participant on an as need basis. Participants suggest that written and signed communications get better attention, face-to-face meetings are better for understanding, the sheer amount of email is taxing and time consuming to weed through, and it is often faster and more efficient to speak on the telephone or in person rather than type email messages. However, participants recognize the strength of email and list serves commenting that it is good to receive announcements on time that they might otherwise miss out on, that it is a written and recorded message and a replacement of memos, that it provides access to shared data and that it is a help to prepare proposals and grants. All of the participants are using email as a communication tool to network within and among departments, their faculty, other faculties, central administration, graduate studies or support services.

Table 3

Communication with Administration (100%)

Advantages	Concerns
Need to read because of the 5% nuggets from lists that is valued information (2).	Formally written and signed correspondence gets better attention (2).
Prefer email for record of what was sent (25, 63).	Old system if I needed information, I'd inquire, the other way now (2).
Email replaces memos (15).	For decision making, one-on-one face-to-face is best (20).
Department, faculty, grad studies (16).	Telephone effective (10).
Get information when it is fresh and current, don't have to wait (4).	Also telephone (100).
Forms are absolutely invaluable, ethics form, the filing cabinet on the website (47).	
For grants (37).	

Technology to Communicate with Undergraduates - Course Related Activities

In addition to communicating electronically for non course related information and with administration, participants are also using email to communicate with students enrolled in their courses. Almost all of the participants (91%) are using email to communicate with students regarding course related activities. As noted in Table 4, comments suggest students have limited access to computers and email, and situations where all of the students in a class have access. Although one participant indicates limiting availability of time online and limiting turn around time for responses, another participant indicates being wired and available 24 hours every day, 7 days a week. One comment indicates a concern about confidentiality of email addresses, and another believes it is public information. Regardless of concerns, most participants (91%) are distributing their own email addresses and using email to communicate with students regarding course related activities.

Table 4

Communication for Course Related Activities (91%)

Advantages	Concerns
Email addresses for students, that is public information as far as I am concerned (3).	Legalities need to be worked out (61).
I am wired for them wherever they are, 24 hours a day (23).	Time. Yes, get back to them within a day (70).
Almost 100% have access to email (12).	Undergrads typically do not use email or telephone to communicate with me, many do not have access to internet (2).

Technology to Communicate with Graduates - Course/Supervisory Related Activities

In addition to communicating with undergraduate students regarding course related activities, most participants (94%) are also communicating with graduate students. As noted in Table 5, participants who are teaching classes or supervising find the use of technology valuable to maintain contact with and distribute information to graduate students. Participants are communicating with graduate students through email, although many prefer face-to-face conversations when possible. "Yes, grad students I supervise, I use email quite a lot, for the lower level communication, but usually require face-to-face with graduate students for meatier aspects" (3). However, with so few students in residence, participants are finding email an essential tool to stay connected to graduate students, to guide them in their courses, in their program and in their research.

Table 5

Communication with Graduates (94%)

Advantages	Concerns
Constant contact with those doing thesis, projects, papers, easy for them to email (4).	Yes email to make appointments but old fashioned come in and meet with me (18).
Always, for supervision, their work, anxiety attacks, finding work (8).	Face-to-face with graduates for meatier aspects (3).
So few are in residence, and those who are in residence will be home (28).	

Technology to Communicate with Colleagues and Professional Contacts

All participants (100%) indicate they are using email to communicate with colleagues and professional contacts. As noted in Table 6, participants are communicating with colleagues and professional contacts within and among departments or faculties on campus, with a network of scholars throughout the world, with schools, with associations such as the Alberta Teachers Association, with government departments such as Alberta Learning, and with organizations, colleges and other universities worldwide.

Participants suggest that email is a great tool to establish rapport and build relationships with the people they meet personally or face-to-face at meetings or conferences. Although working globally opens up the need for language translation systems and although it is time consuming to filter through the mail and correspond with so many colleagues, all participants are using email locally, nationally or internationally. Participants identify email as an easy to use tool that is key to effective and timely communication with professional contacts and colleagues in their field or area of expertise worldwide. "It is the most meaningful, professional contacts in my area of interest internationally, made possible through email" (8). When communicating with colleagues, participants also note that they need to use a file transfer process to share data.

Table 6

Communication with Colleagues and Professional Contacts (100%)

Advantages	Concerns
Big improvement to communicate with other faculties (2). Get information when it is fresh and current. Continue networking started face-to-face at conferences (4). Discover contacts at conferences or through literature, then build relationships through email (8). Most meaningful professional contacts in my area of interest internationally made possible through email (8). Communicate with researchers across the country (40, 13). Between ATA, Universities and Alberta Learning (88).	However, second languages are a problem, need translation systems to be rapid and efficient (10). Saves time but creates need for incredible amount of time (17).

Technology to Communicate - Attachments or File Transfer Process

When asked about the process of file transfer, the majority of participants (94%) indicate they have used electronic file transfer at least once. As indicated in Table 7, some participants have experienced difficulty with attachments or file transfer, are seeking further training, and are fluent with the process. Concerns include hardware or software compatibility problems, lack of information about type of attachment or download, threat of viruses arriving with attachments, and lack of skill or knowledge of the function. However, participants indicate a need for further training in the area as they recognize the growing need for transferring files to and from students or administration, for collaborative writing and research, for board reviews, submission of articles, and submission of key note speeches.

Table 7

File Transfer Process (94%)

Advantages	Concerns
Write collaboratively (4).	Virus alert (19).
Board reviews, articles, chapters or sections (63).	If computers are of the same era (28).
	Almost illiterate in this field (29).
	Once in a blue moon (69).

Communication Summary

Although participants recognize the drawbacks of email, participants are using email to communicate. Participants are communicating regarding non-course related activities such as maintaining relationships with former students, providing research information to students and marketing information for new students—students from the campus or from anywhere students have access to internet mail. Participants are communicating with administration to both send and receive information regarding the administration of the department, faculty or university, for students, or for their own professional development. Participants who are teaching are using email to communicate with the undergraduate and graduate students enrolled in their classes. Participants are also using email to continuously communicate with graduate students they supervise and colleagues worldwide.

Time spent communicating through email has "significantly changed part of academic life" (12). As noted in Table 8, email is time consuming, often taking several hours a day to filter through incoming mail. It is also time consuming to compose responses especially if responses deserve research or thoughtful replies, or if there is a lack of keyboarding skills. The large number of email messages sent and received also poses a problem of storage or archiving and retrieval. The participants note that email has escalated a demand for responses—email senders expect an immediate action or response within hours of a message no matter what time of day or what day of year the message is sent. However, as noted in Table 8, participants also identified strengths of email as "liberating for the deaf or hard-of-hearing people," (2) more like a conversation than a formal memo (38), a natural paper trail, and an excellent tool for information exchanges. Participants have discovered a new world using email to communicate without leaving their desks. Email can be accessible from participants' local offices or from anywhere in the world a web browser connection is available (77). As technology opens up communication to and from students, participants are recognizing the potential to use technologies in their teaching and learning strategies.

Table 8

Communication – Other Comments

Email Advantages	Email Concerns
I could not get by without a computer – need to send in electronic – even keynote speech. Good for written record, but what about storage (15). Yes email I live by in all respects, very important. Email is like a conversation (38). I can get to my mail from anywhere in the world (77).	Takes 60 seconds to view and decide to delete or not (2). 20-30 messages waiting . . . spend a lot of the day dealing with email (3). Can't ignore the messages . . . can be horrendous (12). Here is a recent proposal could you read it please. . . and taking me a half a day to answer properly, and I haven't the time to do it, it's really a big pain (13). People expect a very rapid response (23). Don't have typing (65).

Technology in Teaching / Learning

In addition to asking participants about their use of email to communicate with students regarding course-related activities, participants were also asked about their use of technology with regard to integrating technology into their teaching. Participants were asked about their use of technology in their planning, teaching, assessment and instructional management strategies.

Technology in Planning/Design

In the area of planning, 86% of the participants indicate they use technology. As noted in Table 9, participants are using technology to search library data bases and the internet for information and ideas relevant to their courses and areas of interest. Many participants organize their data electronically and design and prepare course outlines and materials for their courses using computer applications such as word processing, spreadsheets, calendars, and presentation packages. Although participants are hesitant to use technology because of keyboarding skills, or because they prefer to do their conceptual work with paper and pencil, or because they do not know the possibilities of using the technology, other participants depend on it. "It would be absurd to produce materials by hand" (68). Also, one of the participants involved in online courses or distance education or courses developed in partnership with the specialized technology unit reports on the importance of planning and working with a group of specialists:

> Traditional course, I feel I could begin to teach it with a few days notice, maybe that's exaggerating a bit, but with short notice. However, web based courses you need more preparation to do it and you need to depend on more people, as well as be vulnerable to the technology. Web based adds a layer of delivery. Web sites must be updated for each course, course outline and contents. (65)

Most participants (86%) use a variety of technologies when they research and think about the courses they are going to teach, and when they plan the design, delivery and assessment.

Table 9

Planning Using Technologies

Advantages	Concerns
Course outlines/syllabus, assignment sheets, exams, transparencies (1, 2).	Don't have good keyboard skills (2).
Outlines, course notes (6). Calendar (63). Organize on PowerPoint (3). Keep topic areas of computer files to subsequently put things together (4). Spreadsheets (10).	Putting syllabus online—that is an interesting question because I have never thought of doing it, but then nobody has ever suggested it to me that we could do that. Yes. But the office still has binders full of course outlines (2).
Library data bases on campus—outstanding (7). E-journals for content, access other schools, different universities and check their course outlines. Ideas from the web (11).	I need pen in hand to sketch out (33).
Research, including internet looking for information, looking at other universities for course outlines and readings, data bases, libraries (46). Search internet for books, research available (18). Word processing for lecture notes, outlines, bibliographic sources, indexes, readings from web (16).	Partnerships–instructional designer, graphic designer, video specialists, WebCT specialists. Collaborative design, 2/3 time planning, philosophy, design issues, what I want students to achieve, why, how, constructivist approaches (64).
Produce overheads for every written document that I use for students. I couldn't function without my computer. Also statistics package (67). Word processing for planning and design (handouts, overheads) (68).	Teleconferencing – handouts have to be in the student's hands ahead of time - more organization (40).

Technology in Teaching

In the area of teaching, 74% of the participants indicate they use technology. Participants indicate that they are using technology as a communication tool, a development tool, as a vehicle to deliver courses, and as a tool incorporated into their teaching and learning strategies. Within their role as teacher, participants also discuss their present and anticipated future use of technology to supplement courses, deliver entire courses, deliver courses at a distance, and the importance of considering the impact of technology on society.

Teaching – Technology to Communicate

As noted in Table 10, participants comment about their use of technology for communication with their students. A variety of ways are suggested by the participants (27%) to use the technology to encourage communication with students and among students. Participants include their email address on their hard-copy course outlines, post course outlines and events or calendars online, promote shared student email lists and chat groups, use electronic newsletters to keep students in the courses updated, and exchange email messages and attachments. Electronic mail and the posting of information on the internet quickens the right information to the right students at the right time. "You don't have to wait until the next class to update folks, you can do it this way" (4). Electronic communication also supports the incorporation of technologies within the participants' teaching/learning strategies.

Table 10

Communicating Using Technology (74%)

Activity
Email address on hard-copy course syllabus. Calendar of events, housekeeping information and course outlines or syllabus online (2, 5, 8, 12, 16, 38, 39, 63, 65, 3). Email shared class list (5, 7, 22, 58, 65, 68, 74, 92, 93). Electronic newsletter to highlight guest speakers, reminders (4). Distribution lists (7, 61, 74, 87). Website of questions, chat groups (63, 7). Attachments to send course materials (88).

Teaching – Technology in Development, Delivery and Integration

Participants are using technology in their planning. Participants are also using technology to develop their courses, as a vehicle to deliver their courses, and as a tool incorporated into their teaching and learning strategies.

As noted in Table 11, participants are using computer applications such as word processing, spreadsheets, presentation and concept mapping packages, graphic programs, color copiers, scanners, digital cameras, and specialized equipment to plan and build their courses.

As noted in Table 11, participants are using the technologies and support systems to deliver the courses with equipment such as smart boards and smart classrooms, audio and video conferencing equipment, computers, projectors, and the internet. Comments from participants confirm the use of segments of film, videos, audio, and slides on equipment such as recorders, VCRs, computers, televisions, and amplification equipment (8, 9, 11, 18, 20, 21, 23, 24, 28, 34, 48, 49, 74, 75, 96).

Participants are attempting to model the use of technology and the integration of technology with the content. As noted in Table 11, participants integrate technology by setting up online readings, guiding questions to online reading, virtual field trips, virtual case studies, analysis of papers online, analysis of statistics, and team scavenger internet hunts that end with a debrief on team work. Several participants are involved in distance delivered courses. Participants indicate that they are making every effort to demonstrate various kinds of emerging software, hardware, equipment and special applications in their courses (71, 72, 73, 74, 77, 79, 80, 85, 100) such as statistical analysis packages, and language analysis programs (11). Participants also state that they locate websites as resources and ask students to search for websites as well, all to supplement the course content (6, 20, 23, 32, 33, 35, 36, 43, 44, 50, 52, 56, 77, 84, 86, 87, 89, 90, 93, 97). Although many suggest the use of the internet to search for ideas for the course, others stress the importance of discerning what information on the internet is valid and what is trustworthy (34, 4) especially for graduate students doing research. To incorporate technology into their teaching, participants also note their involvement with programs such as WEBCT and their experience supplementing courses or delivering distance courses.

Table 11

Integrating the Technology

Technology	Technology Integration
Smart classrooms (3). Word, Excel, SPSS, PowerPoint, Inspiration (3, 7, 86, 98, 100, 93), telephone, video conferencing (7, 23, 42, 94), specialized equipment such as scanners, photography, graphics, cameras, short wave radio, CD's, digital (39, 23, 43), segments of film, videos, audio, slides on recorders, vcrs, computer, television, amplifier equipment (8, 9, 11, 18, 20, 21, 23, 24, 28, 34, 48, 49, 74, 75, 96). Online / distance courses (27, 32, 42, 49, 90, 10). Develop online courseware / WEBCT (86, 90, 94, 91). Variety as key to effective teaching for different learning styles (visual, tactile), hands-on, books, visual demo, small group, slides, overheads, videos, laser, cds, music, sound, lighting arrangements, connections to websites for content and professional associations (17).	Free access to Emagazines (23). Library data bases (7). Model use of software (38, 46, 68). Help people use (54). Setup online course packs of readings (49). Provide questions to guide reading (8). Get students to analyze statistics (4, 67). Post drafts of papers to do elaborate analysis on (13). Setup virtual field trips (64). Case studies (89). Attachments (5). Team scavenger hunt (85). Suggest websites to students where they can learn more (20, 23, 32, 33, 35, 36, 43, 44, 50, 52, 56, 77, 84, 86, 87, 89, 90, 93, 97, 6). Demo web pages, electronic access (16, 57, 59, 60). Demo software / CD's, photography, hearing / seeing technologies, new technologies (71, 72, 73, 74, 77, 79, 80, 85, 100). Analysis of language demo (11). Internet searches (8). Critical scholarship. Can the data be trusted, how much faith can you put in, where are the weaknesses, compare different viewpoints (34). Provide a unit on problem solving through technology (14).

Teaching – Technology - Specialized Tools

A low number of participants are using a technology such as WEB CT to either deliver an entire course or to supplement a course. As indicated in Table 12, when asked about incorporating technology into entire courses, 7% of the participants indicate they use WEB CT and 2% of the participants indicate they use something similar to WEB CT. As indicated in Table 12, when asked about incorporating technology as a supplement to courses, 10% of the participants indicate they use WEB CT and 18% of the participants indicate they use something similar to WEB CT. Several participants (6%) who are not using any technology such as WEB CT do not know what it is all about: "I don't mean to be glib, but really, I don't know the answer to that question" (32). "WEB CT - what is that - where can you get it?"(18).

Table 12

Technology – Integration Such as WEB CT

Type of course	Using WEB CT	Similar to WEB CT	Not using WEB CT	What is WEB CT?
Entire course	07	02	85	6
Supplement to a course	10	18	66	6

Teaching – Technology - Delivery from a Distance

When asked about distance delivered courses, 19% of the participants have experience and they describe their use of technologies. As noted in Table 13 and Table 14, participants describe advantages of distance education and give advice and participants also contribute disadvantages and concerns.

From the comments, we see that distance delivered courses demand more organization and planning to prepare and deliver materials for online publishing, to work with technical and design specialists, and to plan and setup teaching/learning activities such as online conferences or virtual guest speakers. From the comments we also see it is important to learn to monitor and encourage student participation and interaction online or in audio/video conferences. Comments also suggest that some courses do not lend themselves to the online environment, and remind us to investigate our pedagogy beliefs before embarking on a distance delivered graduate degree, and ask us to consider the learner's needs and culture. "What makes us think we have the right courses for their culture. Context always matters" (87). Participants with experience in distance delivery suggest that anyone teaching a distance delivered course should investigate the amount of time needed for preparation and delivery and what equipment /software needs to be installed, updated and maintained and what student training, technical and academic support systems needs to be in place. Participants who have experienced distance delivery comment on the demands. "Need to work at home evenings and weekends, otherwise you get inundated. Need separate phone line at home" (89). Comments also suggest that teachers need to be cognizant of young people between the ages of 18 and 24 who might need more human interaction to foster motivation than older adults. Teachers are also challenged to think about emotional connections and ask if it is possible for teachers and students to be emotionally connected in distanced delivered courses (90). Administration is also challenged to handle administration of online courses, online (17).

The participants who have been involved in distance delivery are encouraging new educators but are also attempting to raise awareness of the differences to consider in the journey to successfully using technology in distance delivered courses.

Table 13

Technology and Distance Delivered Courses – Advice from Participants with Experience

Topic	Advice to Teachers from 19 Participants with Distance Delivery Experience
Organization	Instructor needs to seriously organize (40). Need facts. This is what you are going to learn, this is the purpose, prerequisite, how it is tied to the Alberta outcomes. Assignments, references, each module laid out in the same way (40). Provide course outline, description of activities for the week, electronic readings, seminar on list serve asynchronous one topic per week, virtual guests, monitor of discussions (16). Ask four general questions and four applied questions. Administration for courses needs to be online. Printing online, cheaper to tell student to purchase a book (65).
Delivery	Encourage students to interact with each other in the chat section. I would read things and ask further questions. Almost everybody was participating. I think the technology encouraged it (90). Two audio conferences – yes fair amount of interaction (90). Site visits at the beginning and end is good (89).
Expertise	I haven't the foggiest how the data went in, I just said here's what's got to go in, and they put it in (34). I'm almost computer illiterate, but I have used First Class, a person helps faculty set it up (42). Did have tech person (37). Would love to [from participant without experience] (33).
Outreach	Excited for distance to reach students in remote area (4).
Assessment	The net combined with a face-to-face meeting – surprised at amount of work students did, they submitted stuff (articles they had written, reactions) and I turned it around quickly, there was lots of communication back and forth primarily of a written nature. I like that, but still prefer a course in which I see students on a regular basis (90).

Table 14

Technology and Distance Delivered Courses – Concerns

Topic	Comments
Awareness	I don't know it (29).
Concerns	No, it doesn't lend itself to text (38).
	Virtual. . .school music credits for this, I don't want to be part of that (75). Against total distance delivered degree, doesn't mean individual courses… our beliefs about pedagogy (5).
	Masters degree through distance learning - I think that is a travesty. WEB CT, I would never deliver a whole course that way, so never is the word, "I would have to be really convinced of the value of it, and I am not" (87).
	To do a wrap of a conference, I usually do the hardcopy, to see the picture. Need to include something like a happy face – learning to communicate online (89).
	Most adults are self-motivated. . .they are more organized and more disciplined, they will read more. Undergraduates between the ages 18-24, you actually need some kind of interaction with another human being to get them to learn or to initiate their own learning. I think that you need that contact, that very personal interaction between two human beings. Question – will machines lose what I value, the emotional involvement. It is important that a student have a sense of the teacher concerned about whether or not they are learning and is willing to spend time and effort in order to enhance that process (90).
	Polled my grad students and they would prefer, in my particular course, to meet on an ongoing basis (96).

Teaching – Technology - Future

As noted in Table 15, when asked if participants have plans to incorporate a technology such as WEB CT as a supplement to their courses or as an entire course in the future, 25% responded positively of whom 18 participants indicate they have not used the technology before. When asked if participants have plans to develop and deliver a distance course using the technologies, 18% responded positively of whom 11 participants have not used the technology before to supplement or deliver an entire course. From the comments, the reasons participants are not using a technology such as WEB CT might be a lack of understanding and access. "How would you provide manipulative resources" (9). "I need models to look at, talk to people see what they are doing" (28).

Table 15

Future use of Technology Supplement, Entire Distance Courses

Type of course	Plan to use	Used previously	Not Used
Future – Supplement	25	07	18
Future – Distance delivered	18	07	11

Teaching – Technology - Core Technical Skills

Of the 100 participants in the study, 25% are teaching or including core technical skills in their courses. As noted in Table 16, participants are including in their courses programs such as data bases, graphing programs, spreadsheets, analysis software, web searches, development and process tools, video, adaptive and specialized equipment. Three comments suggest participants assume students have the skills, and others rely on students to teach themselves or teach each other. Other participants assume the responsibility for teaching the technical skills in specific courses and within other courses for a variety of reasons. Students need to acquire the skills to operate or use the technology to become more technology literate, students need to acquire the skills to communicate and participate in distance delivered courses or technology assisted courses, and students need to have a role model of integrating technology with the content and delivery of courses.

> You need people with technology skills that can teach IT in humanities, arts, English, in all the curriculum subjects as well as in administration. We should be overlapping what C&S [computer and network services] and Computer Science are doing. I think the students that learned how to use the Internet to find those exam questions are a billion times more up to date than if we did a section using the internet. You want to learn how to use a website, not in a computer course, but in a science course. Technology is a process, not the end result. (21)

Table 16

Teaching – Core Technical Skills

Teaching Core Technical Skills	Not Teaching Core Technical Skills
Build data base of readings with core themes (1).	And Authorware does what? (18).
Create data file, create variables (44).	I assume they know it (21).
How to use attachments, how to organize information using spreadsheets or tables (34).	My assumption that students have the skills (86) (87).
Computer graphics (39).	The course includes internet. Students teach each other (32).
Word processing, PowerPoint, Inspiration, Excel (48, 56).	Cohorts know the technology (42) (89).
Authorware (56, 63).	Links to tutorials (49).
Troubleshoot when students are having problems (56).	TA's [teaching assistants] handle it directly (55).
Word, Office, Studio, Eudora, Web tools (65).	They don't seem to need me to teach them (59).
Bibliography, Excel, SPSS (66, 67).	Anything you use, use it effectively (87).
Inspiration, WEB CT (71).	
Teach about sound (75).	
WEB CT, video (100).	
Teach learning concepts in structured technology courses (80).	
Adaptive devices (98).	

Teaching – Technology - How to Teach at a Distance

Of the 100 participants in the study, 12% of the participants comment that they feel they are demonstrating skills on how to teach at a distance, most of whom are doing so by modeling. As noted in Table 17, participants' comments suggest that if others were to learn to use the internet, they would need to investigate the potential, consider the learner and learn by role modeling. Like modeling technical skills, some participants feel they need to model distance delivery to students who may need the skills in their teaching career.

Table 17

How to Teach at a Distance

Teaching Tips	Teaching by Modelling
Integrate the WEB and potential of WEB (16). Consider what it means to be a distance learner (seven years old, fifteen years old, adult) (49). Investigate use of satellite map technology (23).	Informally (65). Indirectly (64). The course itself is a model or example (80). Yes by modeling it (86) (91) (94). It is different culture of learning and how can you make that work (4).

Teaching – Technology - Integration / Pedagogical Skills

Participants are becoming aware of the need to integrate technology into courses generally and to integrate technology into courses like Math 10 specifically. Of the 100 participants interviewed in the study, less than one-half of the participants (47%) are attempting to demonstrate or teach the integration of technology into the curriculum. As noted in Table 18 and Table 19, participants need to model skills to pre-service teachers. "Give people enough experience so that they see how they can do it and more to break the ice and get them willing to try" (25). One participant comments that you can teach integration by providing students with readings and classroom activities, yet others suggest integration is best communicated by example or modeling. Participants support the need to teach integration of technology with the Alberta learning outcomes, with regard to pedagogy and for special groups such as those acquiring a new language, the handicapped, or the gifted. Several participants also express concern that they are the ones who need to be doing the modeling to help preservice teachers, teachers and graduates. Participants can lead by example to show that teachers are responsible for using technology to engage the minds of children, for helping students become critical of the technology, and also to be astute to the hindrances such as the many personalities students can take on when chatting online.

Table 18

Teaching Integration - Pedagogical Skills, General and Specific - Concerns

Topic	Concerns
Integration	Almost implicit in the application (2). Nothing organized, students are doing some of that kind of integration, if anything, they are leading the way (28). Any piece of machinery is not a substitute for good teaching. The technology must work with the teacher to engage the minds of students and get them thinking (87). Yes how to integrate, but not in core subject areas. Lots of talk about potential, but very little has been shown to be useful so not advocating or adverse (11). How teaching and learning in general has changed; gender and computers, chat lines where children take on identities (12). Where does computers fit in the educational process? Is it patient and kind and give feedback that is critical for kids slower in math, slower in reading. Is it for making smart kids smarter? (20).

Table 19

Teaching Integration - Pedagogical Skills, General and Specific, Advantages of Promoting

Topic	Advantages of Promoting Integration
Need	I would if I were teaching undergraduates (5).
	I work hard to make certain that everybody has a clue because once they get teaching, the more they know, the better off they'll be (32).
Ethics	Ethics – Talk about ethics/guidelines (6).
Reading, activities	Talk about multimedia in the language arts classroom…through readings and class activities not through technology itself (9).
	Use programs to demonstrate "What if" scenarios (30).
Model	Yes by practice. The textbook has a website with practice questions, discussion questions, additional readings, links and multiple choice questions. Exams include 6 questions from the website (21).
	Show by example. There is no other way around, I put it in as part of the requirements and most of the students appreciate it (56).
	I model it (86). Yes, informally (94).
Specialized	Language lab (24).
	Work with multiple handicapped children (25).
Strands	Whole technology strand (38).
	Integration – must integrate content / technology (39) (52) (57) (60) (63) (64) (83) (16).
	Integration with social studies, an important element, and history, geography, sociology, anthropology (23).
	Students must provide at least 4 internet sites and CDs, AV material, work with cameras, slides, videos, they are expected to know that they can do this (23).
	How the tool is directly linked to Alberta learning outcomes. Develop video clips of people using technology effectively in the classroom (40).
	Calculators can be used to help learn patterns in basic math or games for place values (46).
	Integration of technology into humanities. Teaching training courses (48).
	Managing technology, integrating technology (49).
	How to use in language arts (70).
	Inspiration and WEB CT (71).
	Graphic calculator, spreadsheet, graphic software (74).
	[Other universities] rewriting courses to include technology (77).
	Yes with pedagogical skills (80).
	Yes, want students to critique (87).
	Integration for gifted (98).

Teaching – Technology - Impact on Society

Most participants (67%) in the study indicate the importance of incorporating the topic "technology's impact on society" in their courses in either a small way or part of the requirements of the course. As noted in Tables 20 to 23, participants stress the importance of the impact of technology and identify components that need to be addressed.

As noted in Table 20, participants draw attention to the impact technology has on learning and communicating. Technology has the potential to radically improve life in the deaf and hard of hearing world, for children with special needs, and for gifted children. One example for educators is learning if and how to use technology. "It is not should you use calculators, but how will you use calculators" (74).

Participants also draw attention to the need to investigate the impact of technology on learning, the classroom environment, and pedagogy. Participants suggest the investigation of the impact of technology on students themselves who have participated in virtual learning environments. For example, what is the difference between a face-to-face group discussion of a novel and an online discussion of a novel, what is the impact of technology on spelling skills when students rely on electronic spell checkers, what are the experiences of recording and graphing heartbeats or studying video clips of physical education maneuvers rather than physically participating in activities. "On the internet, look up videos of gymnastics where he can slow motion look at a picture of executing a double one and half something, so he is mentally going over this in his mind. This is good, but not in the physical "time" (36). Participants are asking educators to be aware of the impact technology has on learning.

Educators are also challenged to think about the impact of technology when they are evaluating or grading. Computer scoring is fast, but is the testing too generic (50). "It's got so if a student turns something in on a typewriter, we frown, as if the quality of the thinking is related to the typeset" (85).

As noted in Table 21, participants stress the need to consider finances as it is related to the greed of technology. "The funding of education—the bottomless pit, the insatiable appetite that technology has" (27). Participants are also asked to include the philosophy of education in courses and the impact of technology on and from society. "Yes, both impact on society, and society's impact on technology" (14).

Table 20

Impact of Technology – Learning / Teaching

Impact	Impact Concerns
Technological changes taken place in the deaf world (2). Impact on them [deaf, hard of hearing] and their future absolutely phenomenal (closed captioning, email) (77). Yes, the gazillion kids who can't seem to make it in the classroom (32). Students with special needs. Example, students with physical handicaps who need more pragmatic kinds of technological assistance, students with cerebral palsy who need different ways to provide responses (53). Special education, gifted (98).	Spellcheck, we don't have the same kind of spelling skills (11). Impact of computers, calculators on learning (55, 60). How students experience virtual space (45, 100). Difference talking about a novel, difference between oral and written (71). Electronic verses print (43). Technology comes up all the time, pedagogy, postmodernism (13). Technology is a social phenomenon. Affect to classroom environment, on learning, future of electronic education (48, 58). Regarding physical activity—60 minutes a week you're supposed to get them fit and enjoying physical activity, there's just not enough time. Doing heart rates, for example, on children and making charts—to me that's taking away time (36). Used to take 2–3 days to run now two or three seconds. Tests computer scored—reports unethical in terms of standards of practice. . . they're so generic, they could be about Joe Blow or Joan Blow and it doesn't make any difference . . . does not address individual needs (50).

Table 21

Impact of Technology Concerning Educators - Philosophy, Policy, Issues

Impact
Philosophy, yes, in all courses (3) (8) (10).
The philosophy of technology is very very important (5).
Yes, both impact on society, and society's impact on technology (14).
Policy impact issues around technology (28).

Participants ask educators to consider society that benefits from e-commerce, electronic sharing of information, and travel opportunities that open up the possibilities of global trading and a sharing of cultures. However, participants also ask educators to consider the impact technology can have in other countries. For example, we are asked what assumptions we make of people in other countries, what is the impact on gender, is there gender bias in systems such as the Dewey classification system, what about the disparity between nations (16). "The first world and the rest of the world, how technology actually makes things worse for those countries because they can never catch up" (24). "Where there is no electricity, the minister of education thinks the answer is bring in a computer to every community, that just doesn't make sense to me, let's start with electricity before we go to computers" (33). Impact on gender/globalization.

Table 22

Impact of Technology Concerning Educators - Society

Impact	Impact Concerns
Effects such as ecommerce (56) (63) (64) (66). Impact on global economy, changes how we do business, interact, use data bases (4). Planes that can get you anywhere in the world ....see different cultures and languages (33).	Take things for granted internationally, several people might share one account (16). How technology affects communities, identities; connected globally but not locally (45). Impact on internet, citizenship, notion of community, national identity, social and cultural affects, concern with fragmentation (48) (58). Impacts gender / globalization (16).

The impact of technology on society brings up the issues of security and ethics. Educators are asked to consider the ethics of online testing and assessments, online therapy, and trustworthiness of data on the internet. Educators also need to be especially aware of ethics and security regarding children. Educators need to encourage awareness of the possibility of lurchers using technologies to prey on children. For example, "pedophiles going fishing in chat rooms" (23) or children gaining access to sexual, or racist or dangerous information. "What are the ethics behind porn sites. Children have access to things like bomb making" (33). Participants suggest the need to be aware of and investigate the need for security and ethics and discernment.

Table 23

Impact of Concerning Educators - Ethics / Security

Impact	
Ethics	People doing therapy online (99). About adolescence and media (21). How neo-nazi could show up if looking for something like "race" or "African Canadian" or "Jews". Ethical applications of technology (23). Global ethics (97). Ethics behind porn sites (33).
Impact	Concerning discernment (87). Barriers, constraints, successes (89). Impact, this is a good area for research. Everybody has an opinion. I don't think it should be money where we start, it is what are the needs of the people, how do we get them, and then how do we develop colleges and programs to meet them (29). What is it, how does it work, how does it change what you are using it for (39). Impact of hardware /software/ network, societal impacts (52).
Security	Effect of hackers and cyber control (73). Negative impact on students, Freedom of Information Act (30). Access, see Neil Postman (80) (96). My limitation also (33).

Most participants (67%) support the need for the investigation of positive and negative impacts of technology on education and society. Participants also support the need to consider the impact of technology on education and society in the future. Participants support the need to raise awareness and for the investigation of security and ethical issues and the need to foster critical thinking with regard to technology.

Teaching – Technology - Graduate Students

Specific to encouraging graduate students to be critical thinkers, seven participants suggest it is every educator's responsibility to alarm their students about new technologies such as the internet. As noted in Table 24, graduate students need to be aware of hate sites, of how information is inter-linked, of what subjects or topics are missing, and how knowledge is being developed and by whom (4). Participants also see that the internet can be an opportunity for graduate students to participate in discussions, communicate with other academics, see how information can be disseminated in the future, and how they can make contact with former students, authors or specialists in particular fields.

Table 24

Graduate Students

Communication	Critical Thinking
Set meetings. Provide opportunity for graduate students to participate in forums, to see knowledge production and dissemination in the future (4).	Use internet critically to see competing knowledge sites around the same topics and how it is hooked to economics, politics, culture and needs of government, business and industry – to see the big picture of how knowledge is produced (4).

table continues

Communication	Critical Thinking
See what other academics are saying and relate it to sites (4). Tell students after they read a dissertation to contact that student by email or telephone or in person. Example: "how did this research that you have done, take you into the future, influence what you are doing now, what have you done since, or I was wondering about…" (22). Suggest sites to student in my 600 level courses, things that I find sort of serendipitously I will pass (3).	Ask grad students to look at hate sites from different groups to give students a sense of how new technologies are being used to communicate long standing historical hatreds. Try to get students to understand the insidious ways that power is still at play on the internet (4). Search for absences on the internet (4).

Technology in Teaching Summary

Most participants (74%) are using the technologies in their teaching. Participants indicate they use technologies to connect with their students, and encourage students to interact with each other in a timely manner. "Best time to write down your problem is when you have the problem (2:00 a.m.) and mail it, even if it isn't answered until 9:00" (63). Participants are using technologies to assist with the development of their courses and as a vehicle for the delivery. Several participants are using technology to supplement or deliver entire courses at a distance and several more are interested in future development. In their teaching, participants are also demonstrating technologies, referring students to websites for additional information, and integrating technology into their teaching and learning strategies. Participants expressed their concerns and recommendations regarding the teaching of core technical skills, the integration of technology, the need to include the impact of technology on education and society in their courses, need for critical thinking, and the need to teach the use of technology by modelling. As teachers begin to email and post information to communicate with students, and as teachers begin to integrate technology in their design and delivery, teachers also look at how technology can be of value in assessment.

Technology in Assessment

In addition to comments about planning and teaching, the use of technology in assessment is also addressed as noted in Tables 25 to Table 28. In the area of assessment, 68% of the participants indicate they are using technology. Participants are using technology to collect documents or test assignments through electronic attachments, and they are beginning to integrate technology with their assessment strategies (6, 18, 56).

As noted in Table 25, participants are using technologies to help develop their assessment strategies and to help them manage the assessment process. Participants use the technologies to develop test banks, generate tests, and analyze test questions to discern how well each question on the test performed. Participants also manage the assessment process by storing and sorting assessments electronically, by providing electronic feedback and by comparing achievement with provincial standards posted online.

As noted in Table 26, comments both support and oppose the use of technology to send/receive assessments electronically. Comments that do not support attachments or the use of technology in assessment indicate a hesitancy due to compatibility problems of attachments, possibility of fraud, preference of students to receive and review hard copy before or while writing, course content that does not lend itself well to technology, and strong preference for hard copy to evaluate and provide feedback on. Comments that support the technology suggest that students submit assessments in a variety of formats including attachments, word documents, web sites, links, CDs, videotapes, and computer presentation packages.

As noted in Table 27, a low number of participants (14%) give examples of how they have integrated technology in assessment strategies. Examples include a request for submission of reflective papers, emailed exams at specific times to be submitted by specific times, computer generated questions to be answered and submitted electronically, participation in electronic discussion groups, submission of assignments electronically to be compiled and pressed on a CD and redistributed back to the class (71), and credit for assigned web searches (72).

Participants involved with distance delivered courses combine the technology with assessment strategies, but many participants prefer on campus students to submit hard copies. As noted in Table 28, when participants receive attachments for evaluation, they are either returned electronically or in hard copy. Of the 68% who use attachments, 5 indicate that they provide electronic feedback and 13 feel strongly that they need to print hard copy, and read and supply feedback on hard copy. "Students want comments submitted electronically…I don't like reading stuff on the computer" (42). As noted in the comments, hard copy is preferred because it is easier on the eyes to read than on screen, it is easier to flip pages back and forth, it is easier and more efficient to edit when you can see more than one screen at a time, it is easier to comprehend, it is more portable to mark in more desirable places than in front of the computer screen, and editing on hard copy is more personal. "Students prefer handed back with comments. Type is impersonal, but so perfect. The handwriting is more personal, yet so imperfect" (87).

Table 25

Technology in Assessment - Test Development - Management

Development	Management
Have a database of questions to draw from (6).	Store assessments (33).
I use a database to generate test questions (18).	I keep my responses to students on computer (19).
Use test bank to develop exams, generate answer sheets, subject to test scoring system here at the university so I can get back an itemized list as to how well the test performed (56).	Print out summary feedback sheets (33).
Used SPSS to find out what questions were or were not discriminating (6).	I will give credit for readings online (90).
	Can look at achievement exams at Alberta Education site and professional sites (46).

Table 26

Technology in Assessment (68%) – Submit Electronically Advantages/Concerns

Advantages	Concerns
Students produced a portfolio or website (9). Submit on CD without support of university (19).	Difficulty downloading (10, 75).
Students use PowerPoint (21, 83, 44, 45). Joint assignments using CD (46).	Concerned about fraud (24).
Submitted using PowerPoint, word processing. Web page. Inspiration (48).	Give copy out in paper, saves students printing, they're happy about that. When we go through it, they have a copy right in front of them (52).
That's very common, assignments as web documents (49).	Prefer to give out in person (55).
Students have submitted on Web and PowerPoint (74).	Nature of assignments don't quite fit the format, it's not that I'm unwilling though (70).
Submit on videotape and CDs (75).	But only if they are out of town (82).
Online courses – yes assessment (27).	No space or desire to read from students who are on campus (68).
Yes for students at a distance (68).	

Table 27

Technology in Assessment – Integrate Assessment

Integrated Assessment Activities
Short reflective papers, mark electronically and return, not essays (16). Reflective papers emailed in (64, 36).
Students can use visual data bases and submit work as computer files (39).
In the form of appraisals (30). Use of video equipment (99).
Group activities, submit, critique (100). I email exams – the student contacts me by phone or email or in person and tells me when they want to write it, and then I send the document and then they have to return it to me in five hours, and if they want to do it at midnight, I know what time I gave it to them (21).
Exams have a computer component to them, not during every exam, but at least during one of the exams, run a computer program in order to generate the answers to a certain set of questions (66).
Insist students use computers on all assignments, submit using word processor (56).
Electronic discussions – would do a wrap to see if objectives were met (86).
Undergrads submit the assignment electronically, then we can press a CD to give them to everybody, so they came away with 10 or 12 (71).
Students have assignments where they have to do some web searches (72).
Pull data from Stats Canada (74).
Post on common drive students can access (52).

Table 28

Technology in Assessment (68%) (Edit Online)

Advantages	Concerns
Electronic feedback on assignments through email, instant clarifications about questions (12). Edit online (37). Give students feedback on computers (33). Respond and return electronically (89, 96).	Need to edit hard copy even if sent as attachment (12). Would print because don't like reading on screen and I want to write on the copy (14). I will print and respond on hard copy (22). I don't feel I edit stuff from the screen as well as I can edit on paper (25). I prefer hard copy but I am flexible (35). I enjoy doing my marking in either my living room with music on or at a café or at some nice place, not in front of my computer (42). Students submit electronically, secretary will print it for me (45). Difficult for me to edit online (56). I don't like seeing one page at a time on my monitor, I like to flip back and forth quickly and I don't find it quick when I am trying to read on the monitor (68). Would rather have hard copy. I hate reading things off the computer screen. I don't want email assignments (75). Only if they are out of town. Prefer hard copy. Edit online is too difficult. Always print (82). Hard to get the gist scrolling (87). Print, write on it, turn it back within a day (90).

Although participants indicate that they use technology in assessment, the majority of participants limit their use of technology to the receipt of attachments from students and arguments prevail as to the advantages and disadvantages of marking online. Participants also share ideas on how they integrate technology into assessment and suggest that technology can also be used to help store responses to students and store feedback sheets (33, 19) to assist in instructional management.

Technology in Instructional Management

In the area of instructional management, 32% of the participants indicate they use technology. Some participants in the study are reluctant to use the technology and others are seeking ways to become familiar with its use.

As noted in Table 29, of the 32% participants who use technology for management, 23 are using calculators, computer programs such as spreadsheets, databases, WEB CT, file storage and backup systems, and systems to record and retrieve advice and comments given to students. Of the 32% participants using technology, 5 participants indicate a preference for marking and returning assessments online and obtaining class lists electronically, whereas others are amused that although they can record electronically, they cannot submit electronically to administration. Others from the group of 68% who prefer not to use technology comment that it is because of their typing skill, because of smaller class sizes, because it needs to be submitted manually anyway, because they simply do not want to, yet 6 participants comment that they are ready and willing to learn.

Table 29

Management Concerns and Advantages

Concerns and Advantages
Concerns
Lack of Awareness - Does the calculator built into the computer count as using technology? (6). Don't know how to use a program to report grades and stuff, I don't even know how to use Excel-which is craziness. I would like to know how (28).
Infrequent use, forget how to use them (33).
I don't know how to do that (45). No, need more help (11).
I didn't realize that they could send you an attachment from optical scoring with all of the listings of students—why didn't somebody tell me about this?(50).
No but probably should start (60).
That part I am going in reverse in technology (88).
Deterrent – Sometimes I find it quicker because I am a slow typer, to tabulate and add and do all that stuff mentally. 12 and 200 people – that is totally different (3).
Advantages
Software – Spreadsheets (3, 10, 16, 21, 25, 27, 35, 52, 55, 56, 65, 66, 68, 74, 80, 87, 93, 99). Data base (8). Web CT (86). File and keep backups (4, 48, 87).
Keep files on all my students electronically. Keep a record of what advice I have given, I do keep a record of my comments on student's papers (5) .
Statistical calculator gives me flexibility to move around (23) and because you have to submit a hard copy to the department (23). Why—we have to submit on paper (24). Yes that's all that I use, and I would love if we could enter our marks on the computer (46).
Computers makes fewer mistakes than I do by hand (63)
Source of amusement – we have the most sophisticated spreadsheets to figure out marks, marks are still communicated manually. I want to get the class lists electronically—not been the norm.. Need name, ID#, email address to cut and paste. Who can you ask for this, how can you get it? (65). Freedom of Information – so marks have to be submitted so students can access their own marks – that takes time (17).

Demographics - Teaching

Of the 100 participants in the study, 58% were male and 42% were female. With regard to teaching, 47% identified strategies to integrate technology, of which 29 males (61%) and 18 females (39%) responded. Of the 14% who identified strategies to integrate technology in assessment, 5 males (35%) and 9 females (65%) responded; and of the 32% who identified strategies in instructional management, 24 males (75%) and 8 females

(25%) responded. Most who responded to assessment were female, whereas most who responded to management were male. However, the percentage of males (58%) and females (42%) in the study closely matched the percentage of males (61%) and females (39%) integrating technology.

Technology in Teaching / Learning Summary

Almost all of the participants (86%) are using the internet and electronic data bases to search for information and ideas relevant to their courses and participants are using computer applications to organize and prepare for their course. Participants bring to our attention the need for extra time and planning when using technology in their courses, especially courses delivered partly or entirely from a distance.

In the area of teaching, most participants (74%) indicate that they are using technologies to communicate with students, to develop and deliver courses and to integrate the technology with course content. However, when asked about integrating technologies with the course content, 47% participants indicate they are either integrating technology generally or specifically, 37% are using a technology such as WEB CT, 19% of the participants are involved with distance delivered courses, and 25% are teaching core technical skills. Several participants (6%) indicate that they are not using these technologies because they lack information about its use, and 25% state that they are interested in learning in the future. Of the 100 participants, 67% are interested in teaching and discussing the impact of technology on society in their classes.

With regard to assessment, more than two-thirds of the participants (68%) indicate they are using technology in assessment such as sending and receiving attachments, however, a low number of these participants (14%) give examples of integrating technology with their assessment strategies. In the area of instructional management, 32% of the participants are using technology.

With regard to using technologies in planning, teaching and learning, assessment and instructional management, the faculty recognizes the need to support participants and help is made available. "Support for teaching, located down the basement is superb, very very helpful" (20) to learn about "instructional presentations, Mac, IBM, color printers and copiers, and transparencies" (62).

Participants are using technology in their communications and in their teaching and learning, but participants also use technology in their research.

Research

In addition to asking participants about their use of technology in their communication and teaching, participants were also asked about their use of technology with regard to their research. One of the roles of the participants is conducting research and technology provides a range of opportunities for assisting with research in the areas of searching, gathering, analyzing, and publishing. One-hundred participants responded to questions regarding research, however, not all respondents were academic researchers, some participants were involved in service, administrative or management positions. Participants were asked what type of research they were usually involved in. Participants were also asked about their use of technology in their (1) searching (2) gathering (3) analysis and (4) publishing.

Type of Research and Use of Technology

When participants were asked what type of research they were typically involved in, participants self-identified themselves into qualitative, quantitative, both, other, neither or not applicable. As noted in Table 30, the most popular choice is qualitative. Of the 100 participants interviewed, 49 selected qualitative research, 18 selected quantitative, 22 selected both, and 3 participants selected other such as historical, text and creative. The two participants who selected neither and six participants who selected not applicable were respondents who also self-identified themselves as being involved in service, administration or management. Participants selected one category only, therefore the 49 who selected qualitative are primarily qualitative, the 18 who selected quantitative are primarily quantitative, but those who selected both could be included in qualitative and qualitative. Therefore, the overall number of participants involved in qualitative would increase to 71 and the number of participants involved in quantitative would increase to 40.

Table 30

Self-Identified Types of Research

Number of Participants	Type of Research
49	Qualitative
18	Quantitative
22	Both
03	Other
02	Neither
06	Not Applicable

As noted in Table 31, in the area of research, all participants indicate they communicate with colleagues, both locally and globally by email. A high number of participants use technologies for searching (81%) and writing (88%), although not all participants are faculty researchers. Almost two-thirds of the participants use technology to gather (64%) and for analysis (62%), and most participants use technology to write

(88%) and to publish (70%). Once participants self-identified the type of research they were involved in, they discussed their searching, gathering, analyzing, and publishing.

Table 31

Use of Technology in Research

Number of Participants	Use of Technology in Research
100	Colleagues by Email
81	Search
64	Gather
62	Analyze
88	Write/Edit
70	Publish

Searching

Most participants are using technologies to assist them in their search for information for their area of research. Of the 100 participants interviewed, 81% indicate that they are using technologies such as web sites and search engines on the internet, data bases, library data bases, visual data bases, and electronic journals to seek information. Participants are using search engines on the internet that locate information from both typical and atypical sources. As noted in Table 32 and Table 33, participants are using technologies as research tools in their literature searches, searches for current information and information about what others are also doing in their field. There are also participants who are completing their searches by alternate methods such as hard copy journals and trips to both their local library and university libraries. "Old ways because you can find something that is shelved right next to the thing you were looking for" (24). To increase their productivity, participants also ask others such as research assistants, graduates and library people to assist with searches. These participants seek assistance with electronic searches because they feel others are more efficient than they are, although one participant indicates an intention to learn. Most participants (81%) are using the technologies in their search for information, and one participant suggests we organize our searches electronically to better manage our gathering and analysis of data. "Build a computer file, my critical analysis and hot quotes I might use at some time so I don't have to go back to the reading unless I want to check something for accuracy" (4).

Table 32

Use of Technology to Search – Comments that Identify Tools

	Searching Tools	Participants
29	Internet / search engines	(1, 2, 3, 4, 10, 12, 18, 23, 25, 26, 29, 30, 35, 42, 48, 56, 65, 66, 67, 68, 70, 71, 76, 82, 86, 87, 88, 90, 93).
10	Databases, library, government	(1, 18, 64, 68, 80, 93, 98, 39, 87, 97).
1	Visual data bases	(39).
1	Forums	(4).
6	Electronic Journals	(3, 8, 9, 11, 35, 68).

Table 33

Use of Technology to Search – Comments that Identify Use

Using technology to search	Not using technology to search
Anything more recent (2, 4). Find themes that are hot (4). Library databases is critical (18). What other people are doing (26). Stats Canada is a goldmine (43). Endnote to import (63). National Archives of Canada (48). On-line is the first place we go (66) Heavy use of library systems (8). Yes, selectively rather than fishing (90). Literature review (16, 79).	Subscribe to a lot of journals (5). Research assistant does this (5, 28, 55). Hire people to help (32, 33). Grad students more proficient (69). Tend to go to the library (36). Have our own library (82). I don't know it as well as I should (37, 57). Yes, but not very efficiently (71). Yes WEB, but also physically go to library (73).

Gathering

Almost two-thirds of the participants are using technology to assist them in their data gathering in their research. Of the 100 participants interviewed, 64% are using technology with equipment such as audio and video recorders, scanners, cameras, editing equipment and computers. As noted in Table 34 and Table 35, participants are gathering data such as readings from electronic medical equipment, from downloading data onto their computer from internet sites from around the world, from information pulled from data bases and census records and from online tasks and surveys. Participants are using data transcribed from audio and video tapes, and from scanned or digitized clips. Participants are looking at ways to gather data such as digitizing and speculating what it will bring to their research environment in gathering, analyzing and publishing. Participants are looking to the future for ways to gather data and for ways the data gathering could ease preparation of data for analysis. "Helping get data into usable form so people can do analysis on, we're just starting to use websites for questionnaires where you can respond directly, possibly interactively" (61). "Interested in how technology can gather data direct" (11).

Table 34

Use of Technology to Gathering Data – Comments that Identify Tools

# Comments	Gathering Tools	
18	Tape recorders	(1,6, 7,9, 10, 11, 14, 22, 24, 48, 59, 69, 71, 74, 78, 79, 83, 87).
10	Audio, video recorders	(1,6, 14, 19, 36, 39, 71, 73, 74, 77).
2	Scanners	(4, 16).
2	Cameras	(22, 71).
7	Electronic surveys/ questions	(15, 42, 49, 59, 61, 74, 86).
1	EEG	(20).
1	Computer to edit video	(39).
6	Computer, email, webpages	(53, 68, 74, 80, 75, 89).

Table 35

Use of Technology in Gathering Data – Comments that Identify Use

Using technology to gather.	Future use of technology to Gather
EEG to record normal and dyslexic adults reading, attention deficit – record and give feedback (20).	No, but students do (3, 37, 32).
Collect from across Canada downloading (81, 26).	We are toying with this idea (96).
From websites (29, 30).	How technology can gather data direct (11).
Out of government websites, census files (35).	Want a highlighter to scan excerpts of text (16).
Video the interviewee, ask a second interpreter to interpret (77).	Need to compare face-to-face interviews with web responses—obvious differences (25).
	Future digital records to digitize speech, randomize, normalize volume (24).
	Future – digital (63).

Analyzing

Almost two-thirds of the participants are using technology to assist them in their analysis in their research. To clarify the use of technology in analysis, examples such as SPSS and NUDIST software were mentioned. Of the 100 participants interviewed, 62% are using programs such as word processing, spreadsheets, voice, and quantitative and qualitative analysis programs as tools in their analysis. Although 26 comments support the use of quantitative statistical analysis programs, 2 participants attest to difficulty graphing and importing and gaining access to the program. Although seven comments support the use of qualitative statistics packages, several feel a qualitative statistics tool is not appropriate for their qualitative analysis. "No, looking for key passages, not how often it occurs. However, will use find searches for fishing. Close reading is most important" (16). Comments also suggest that some participants seek help from graduate students and research assistants and specific university groups who have the skills and expertise to provide help with analysis programs. Participants are using technology (62%) in their analysis and participants are using word processing as a major tool for writing.

Table 36

Use of Technology in Analysis – Comments that Identify Tools

#	Tools or Programs	Comments
8	Word processing	(1, 6,11, 13, 16, 35, 77, 79).
9	Spreadsheets	(15, 24, 25, 26, 35, 38, 56, 63, 65).
26	Quantitative statistical analysis	(2, 6, 7, 17, 18, 22, 23, 24, 34, 40, 42, 55, 56, 58, 63, 64, 65, 66, 67, 68, 72, 80, 89, 93, 96, 99).
7	Qualitative analysis	(9, 22, 25, 49, 63, 87, 71).
2	Speech recognition	(24, 34).

Table 37

Use of Technology in Analysis – Comments that Identify Use

Comments
SPSS. Yes quantitative, wrote own programs (17).
Yes, write the programs to create data bases (52).
Yes, SPSS for Social Studies (55).
SPSS in the past, but issue about availability (50).
Excel because SPSS graphs are a complete nightmare importing into WORD (35).
CRAME for SPSS (38, 49, 69). SPSS next year (59).
Never heard of SPSS (73).
NUDIST. No. Instead of abstracting, I work down into concreteness, into depth so the ultimate challenge for qualitative writing is the poetic, not the theoretic, the challenge is to go to the concrete to meanings embedded in experience….like any artist who wants to see what is really there (13).
It's not just coding, you need to acquire insights, go after meaning, advance researcher's understanding, move them forward with questions (45).
It's not the type of analysis I do (interaction that can be emotional, physical) (46).
No to qualitative analysis, tried them, threw them away because they make mechanistic what needs to be partially intuitive, they are data storage programs that can inhibit my students doing their own thinking. I do recommend language analysis programs (85).
No Nudist (60).
No but working with students who are learning NUDIST. Yes, but NUDIST no substitute for slugging through (87).
No Nudist, not appropriate for historical
Research assistant does this (28).
Graduate students do this (29).

Writing / Editing

Most participants are using technology to assist them in their writing and editing in their research. Of the 100 participants interviewed, 88% are using word processing in their writing and editing. Other programs were also identified such as Procite, PowerPoint, Front Page, Finale for Music, End Note and Digital Photography.

As noted in Table 38, comments from participants suggest that they are finding word processing "incredibly valuable" (27) and "liberating" (91). Participants are using software programs for applications such as writing, publishing, for sending attachments, developing websites, writing grant applications, charting and graphing, scheduling, and writing or working collaboratively. When writing collaboratively or editing, some participants prefer to write and edit online but many do not. Many participants suggest that they prefer difficult writing or conceptual work by paper and pen and editing in hard copy. Many prefer hard copy because ideas flow better, and because it is easier to flip pages and cut and paste than to do the same task online. For example, one participant comments, "I'll print, much more confidence in ability to read more carefully a printed document" (15). Also typing skills can be a deterrent, thus the suggestion to use dictating equipment and ask a specialist to return typed and formatted documents.

The majority of participants (88%) write and edit using technologies, with specific emphasis on word processing. To write collaboratively, participants are sending and receiving attachments and they are also sending their writing as attachments for publication.

Publishing/Disseminating

Most participants are using technologies to assist them in publishing and disseminating their research information. Of the 100 participants interviewed, 70% indicate that they are using technologies such as attachments, file transfer process, transporting by disk, posting to websites, and development of multimedia materials. As noted in Table 39, participants indicate that they are submitting articles to reviewers and receiving their articles back from the reviewers for editing, linking their bibliographic references, submitting papers to online and offline journals. With regard to disseminating, participants note that they are beginning to use technology to provide handouts via email attachments, prepare work for publishing, use presentation software in their presentations, produce posters and overheads and build and post to their own website and other websites, and provide links to and from relative websites.

Table 38

Use of Technology in Writing/Editing – Comments that Identify Use

Use of Technology in Writing	Concerns
I could not do without (9). Critical (18). A given (19). Incredibly valuable and versatile (27). Pull the writing together, I make words fast (32). Why somebody would write an essay with a pen, I just cannot imagine (38). Word processing is liberating (91). Yes compose online (87). Split screen editing (22). Track any editing changes that you make then you can send them as an attachment (24). I write online, I prefer to edit online (63).	Write faster than I can type. Can't get same spatial grasp of work, scrolling back ten pages does not equate to ability to turn back and put pages together, maybe that's my degree of sophistication (2). Write on computer unless really tough then I make scratchy notes. Word processing forces you to think in a certain kind of way, not very good for difficult conceptualizations—there I have to make sort of diagrams and notes. I know there are programs but better by hand (5). Still use paper (14, 15).

table continues

Use of Technology in Writing	Concerns
Co-author (4, 12, 14, 32, 24). With colleagues around the world (17, 22). Collaborative work (20, 40, 46, 59). Sharing databases (22).	If I don't like the organization or sequence I go back to handwriting or hard copy to see everything (20).
Develop websites, grant applications (30). Yes for publications, Alberta Journal of Educational Research (31). Chart programs for diagrams, critical path method tools to figure out what can be done in parallel and for motivation (40).	Dragon would help because of poor typing (34). I write fairly voraciously…I write with a dictating machine because it comes back in paragraphs and grammatically correct whereas my typing doesn't do that (30).
Word processing obviously (6). Procite (46). PowerPoint (52). Front page (56). End note (71, 93, 98). Finale (75). Digital photography (80).	I edit a lot as an external examiner for students all over, I edit with a red pen, not any machine (30). My free exploration of ideas happens better when I can handwrite and draw arrows and make little lines so I still need to handwrite. Advantages to look tech paper journal—you can flip pages back and forth makes it quick and fast, and it is easily transportable (87).

Table 39

Use of Technology in Publishing/Disseminating – Comments that Identify Tools and Use

Tools	Use
Attachments, file transfer process, disk, websites, multimedia	Submit to reviewers (23). Receive edits from reviewers (22). Copublish (2, 4). Bibliographies that reference or links to websites (4). Online and offline journals (16). Layout chapters before submitting on disk—makes it move rapidly (26). Disk (20). Conference papers (59).

Research Interests

Participants are interested in a wide range of research areas. For example, researchers are investigating the needs and experiences of the deaf or hard of hearing (2), family violence (2), research methodology (5), teaching (7, 9), subtle teaching or the personal ways teachers use their voice, their walk, or how they relate to students (13), reading intervention (20), second language acquisition (24), interconnections of children with disabilities who are abused, children who become disabled because of abuse (25), government financing of education (27), roles of deans and chairs (34), mature students (35), equity and physical education (36), beginning teacher support (36), cognitive processes of learning – higher education (42), full day kindergarten (68), mentorship (68), standards for band programs (75). Participants are interested in or involved in a variety of areas of research and some of the research involves the topic of technology, and some of the research uses technology to search for, gather, analyze and publish.

Of the 100 participants interviewed, 45% indicate that they are using technology either researching in the topic area of technology or using technology as part of their research method. Participants indicate in their comments that part of their research is on technology such as responses to essays about technology, library use of technology, world wide web, satellite technology, doing proposals and annual reports online, role of visuals in research, technology in the classroom, integrating technology, and social implications. Using technologies in their method, participants identified scanners, search engines, online surveys, digital editing, electronic submissions, statistical analysis, simulations, electronic modules and speech recognition.

Table 40

Research Technology

Research Topic	Research Method
Searching for history (4).	Using technology in virtually everything we do (2).
Response to essay about technology (8).	Scanning devices such as magnetic imaging (3).
Dewey Decimal Classification analysis for gender bias. Women's thesaurus linked to Dewey numbers, evaluated for link or fit (16).	Searching (4).
WEB, CD, Textbook (17)	Science of attracting and looking after students electronically. The art of attracting students is the other side where we actually talk to people and take care of them in person (7).
Satellite map technology (23).	Canadian feminist thesaurus bilingual, online survey (16).
Proposals (29).	Digital video editing (19).
Annual report (31).	Submit electronically (38).
The role visuals play in research (39, 63).	Statistical analysis (55, 66).
What practices in classroom they find are helpful and supportive (45).	Computer systems (56).
Vicariously through students (5).	Simulation (79).
Technology and math (46, 60, 74).	Electronic modules on the web (80).
Virtual schooling (47).	WEB CT (86, 97).
Technology integration in the humanities, teacher stories (48).	Dragon speech (99).
How does the mandated technology outcomes affect teachers (48).	
Virtual high schools compared with traditional schools (48)	
Internet in schools and teacher learning (49)	
Learning disabilities (53)	
Social implications of technology in terms of society (58).	
School architecture (63)	
Internet use in schools (64).	
Adolescent writing – ways in which they use programs (71).	
Meta ethics in technology (87).	
Integration (91).	

Demographics

Of the 100 participants involved in the study, 49 self-identified their area of research as mostly qualitative, 18 quantitative, and 22 as both. Eleven participants were involved in other research, or did not respond, or were not involved in research directly.

Of the 49 in qualitative, 23 (47%) were female and 26 (53%) were male. Of the 18 in quantitative, 6 (33%) were female and 12 (67%) were male. Of the 22 in both, 9 (41%) were female and 13 (59%) were male. More male researchers were involved in quantitative, and a combination of qualitative and quantitative research than female researchers, but there are more male researchers (58) involved in the study than female researchers (42). The number of male and female researchers involved in qualitative are almost equal.

Research Summary

Participants identified the type of research they are mostly involved with, and how they use technology in their searching, gathering and analysis. Almost one-half of the participants (49%) are involved with qualitative, 18% are involved with quantitative, 22% are in both qualitative and quantitative, and 3% of the participants are involved in specialty research. The remaining 8% of participants did not select a research type because of their involvement with management, administration or support. Most participants (81%) are using technology such as the internet and library data bases to search for information and ideas relevant to their field. Participants provide tips to increase productivity when searching using technologies, and conversely participants give reasons why non-technology searches are most effective. Although almost two-thirds (64%) of the participants are gathering data for their research through the use of technologies, many are asking for new, better, and faster ways to capture data electronically. Almost two-thirds (62%) of the participants are using technologies to analyze their research data. However, only 26 participants support the use of technology for analysis. Several participants give reasons why it is not technically user friendly, and why it does not fit with their philosophy of close reading for meaning and insights. Although 88% of the participants are using the computer for writing and editing, several participants explain why conceptual thinking and editing in hard copy is preferred. For publishing and disseminating, 70% of the participants are using technology. Participants identified a wide range of research interests including topics related to technology and the use of technology in their research projects.

Technology

Introduction to Technology

Participants are using technology in their communication, in their teaching and in their research. However, to use technology in their work, participants need a supported infrastructure in place.

Websites

Websites are being used by participants in their courses and in their research. Of the 100 participants interviewed, 48% of the participants are using unit or department websites, and 26% of the participants are using personal or course related websites or websites specific to a topic or organization, and of these participants, 9 are using both. Participants also make several comments about the future use of websites.

Table 41

Type of Web Sites

# Participants	Website
Personal or Course	Personal (10, 29). Course (5, 12, 13, 23, 35, 36, 37, 48, 49, 52, 57, 58, 59, 63, 64, 65, 70, 71, 79, 80, 87, 88, 91, 94).
Unit or Department	Unit or Dept (1, 2, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 15, 16, 21, 22, 25, 26, 29, 30, 31, 32, 33, 35, 37, 42, 46, 49, 51, 52, 56, 63, 66, 68, 73, 74, 75, 76, 77, 82, 85, 86, 88, 89, 90, 91, 96, 100).
Both course and unit	Course and unit websites (5, 12, 35, 37, 49, 52, 63, 88, 91).

Of the 100 participants interviewed, 26% indicate that they are using personal or course related or topic related websites. As noted in Table 42, participants are incorporating course websites into their teaching and learning strategies such as posting drafts of all student papers for later analysis, asking students to each contribute relevant links for a collaborative work, supplying instructor presentation overheads or slides online for later use by students, and by supplying information about the course, issues or concerns to students and in some instances, to teachers in service and the public. One participant warns though that replying to over 400 emails from a website is unreasonable (57) and to establish web sites, participants are commenting that they do not have enough time to learn, build and maintain sites and are looking to the department or faculty for development and maintenance support.

Table 42

Use of Web Site – Personal and Course Related Comments

Personal, Course	Concerns
Post drafts of papers then take them to class to do elaborate analysis on (13). Supply hard copy as well. Portal site for Canadian teachers with links to major internet sites, from Canadian history and picture to National Archives, to government sites, to first nation locations (23). A Canadian educational poverty program available (79). PowerPoint presentations (80). Students to each contribute a link—a collaborative adventure (87). When you go somewhere you could say read this article online, download this, or come to the workshop with one page written on this, and people can access stuff, I don't have to send in the mail or do it on paper (13). Yes for courses, nice with various sections for individual instruction (70).	No, but sure would like to have own website (18). We are encouraged to move ahead with our own website (9). No, no time, can't keep up with my email and voice mail (60). No, lack of time to put one up (56). Problem finding time to keep it updated (49). If somebody would do it, yes, absolutely, that would be great (24). No, I don't know how to work one, I don't really want to learn, I want someone to inform me (28). Technical person put the website up for me, and all I do is feed her the information and she hooks up everything, which I think is great, that's the way it should be (37). Yes, but not kept up (87).

Of the 100 participants interviewed, 48% indicate that they are using unit or department websites. As noted in Table 43, participants are receiving email from unit or district websites and they are using these websites to communicate. Participants indicate in their comments that they are using unit or department websites for a variety of reasons. For example, participants are using unit or department websites for distance delivery, special interest groups, curriculum development, committee work, board work, to reach alumni, to coordinate student teacher placement, to market programs, and to disseminate information to students, teachers in service, colleagues, and to the public. One participant sees the potential of department websites opening up communication to promote the department and to solicit funding, but also sees the roadblocks. "Technology can be used for more than research and publication, but to advance the institution or unit. It's a very powerful potential, but the roadblock is to invest in the server and people required" (34). Another participant also mentioned that they need more resources to build and maintain sites. "Need more time and people to update and answer/route mail" (25). Concern was also expressed that not all department websites reflect specific interest areas.

Table 43

Use of Web Site – Unit or Department Related Comments

Use	Concerns
Special interest groups/forums. Gives teachers information (25). Somebody who is just interested… leads to somebody who actually wants to come in and take the course. Students who are here…gives them contact. List serves (child abuse, inclusive, violence) (25). Boards (29). Incorporates email address (30, 51). Social studies (32).	That's another time spent away from the day now having to maintain a presence. I don't see the responsibility of maintaining the website as academic (87). Yes we worked on the content, but not the technical (11). table continues

Use	Concerns
Distance courses (42).	
Committees (46).	I don't think our area is represented very well on the department website (24).
Curriculum (74).	
News (76).	
Student placements (88).	
Colleagues I bump into at conferences want to give our website to download information (87).	

In addition to the participants who are using personal and course related websites and unit or department websites, many others are interested and talk about the future of websites. Participants suggest that website addresses should be included on all business cards (5), that a website is required for potential students and a website is required for graduate students to monitor and guide their own program (6). Participants indicate a future need for a stronger university presence online. "Faculty's presence online is weak, primitive, embarrassing when we are counting ourselves as one of the three best universities" (13). Participants also indicate that websites should make communications for students more self-serve. "Students should be able to click and say "what course are you interested in, have you done this, have you done that, then click here and download" (13).

Electronic Journals

Participants are beginning to post and read journals online. Of the 100 participants interviewed, 18 indicate that they have posted to an electronic journal at least once. Of the 100 participants interviewed, 37 indicate that they have read online or printed and read an electronic journal article at least once. Many participants note that more and more is being posted online such as journals and conference proceedings. One participant notes that you can also post proceedings on local servers for colleagues and students. Another participant comments that even when you submit for offline publishing, you are asked to sign a release for future online publishing. "I have noticed lately that a lot of times when I do publicize, it has a little paragraph that says this is also going to be published on our website" (25).

Email

Email is being used extensively by participants. As noted in Table 1, at the beginning of the section on Communication with Technology, of the 100 participants in the study, 92% are using email for non-course and 91% for course related activities, 100% with administrative staff, 94% with graduate students and 100% with colleagues and professional contacts.

Many participants (74) are also connected with personal or department websites where email contact is also established. Participants identified the use of email and advantages of time, money, and outreach, but they also identified concerns. Participants warn that the large amount of email can be overwhelming and take up to several hours a day (42). "It can, in some sense, really structure your day" (50). "Over 400 email responses from my website, it doesn't do it for me" (57). Others find it invasive and look to administration for help. "Most invasive thing, wish 80% handled by staff (85). However, 100% of the participants use email to communicate with their students, prospective students, former students, administration and colleagues worldwide.

Using Technology - What Went Well and What Did Not

When asked about using the technologies, 36 of the 100 participants in the study gave specific examples of what went well and 57 gave examples of what did not go as well. As noted in Table 45, comments from participants suggest that they have been successful using different pieces of equipment, hardware and software and that they have been successful at receiving help and support from others. As noted in Table 44, comments from participants suggest that they had some level of difficulty with the infrastructure, email, distance delivery, and tools, however, participants also recognize the need for help through professional development. Participants suggest they had difficulty with the infrastructure such as access to labs, compatibility of equipment, hardware and software (brands, age, interface, geography), reliability of the technology, use of pdf, scanners, printers and need for testing of the technology and its affects. Participants had difficulty with the volume of email and expectations for responses. Participants identify a need for people to understand the blend of technology with curriculum. Participants suggest they had difficulty with distance delivery such as demand for their time, expectations of students and need to know how to facilitate interaction and write online. Participants had difficulty with presentation programs, communication tools such as TimBuckTwo and qualitative statistics packages.

Although comments from 36 participants suggest they were successful at using a variety of technologies and obtaining help, comments from 54 participants suggest difficulties existed for them in the infrastructure, email, distance delivery, and tools. To address the need for help and the need to become more skilled or efficient using technologies (53), many participants suggest the need for professional development. One participant is looking for a variety of professional activities because, for this participant, "trying to learn on your own does not work" (80).

Table 44

Technology – What Did Not Work So Well

Topic	Comments
Infrastructure	Computer lab booked (1, 19), difficult to contact teachers by email (59), compatibility (12, 1, 57, 69, 86, 90, 93, 41), reliability (2, 37, 38), scanners (20, 69), virus (45), interface (88), printing (85), much of what is out there is not tested (17).
Email	Can, in some sense, really structure your day (50), 400 email responses from my website, it doesn't do for me (57), email from everywhere, people abuse it (75), most invasive thing, wish 80% handled by staff (85), overwhelmed by messages (42).
Curriculum	Lack of people in technology that know curriculum (70).
Distance	A lot of time to handle online/email, large responsibility on learners (10), impoverished in terms of ability to interact with other students (26), students expect availability (26), audio/video conferencing (39, 85), instructors need to improve the way they handle group participation… express yourself in writing online (34).
Tools	PowerPoint (6, 8, 37, 77, 60, 66, 74,71, 79, 86, 96, 98). TimBuckTwo (76). Not impressed with qualitative data analysis software (68).
Help	Need help with Adobe Premiere (6), other things (11), Endnote (43), linking sites (48), lack of skill to be efficient (53), trying to learn on your own does not work (80).

Table 45

Technology – What Works Well

Topic	Comments
Resources	Office open over noon—staff is wonderful! (9). Support from secretaries, Gary does a great job (11), people willing to help anytime (11, 33). Library workshops are fabulous (12).
Technology	Library holdings (88, 98), office package (99), simulations (64), digital cameras (63), overheads (59), internet (35, 1), electronic backups (3), budget (4), work from home (36), email (5, 6, 85, 21), chat room (71), online journals (12), everything (22, 26), PowerPoint (48), stats programs (55, 66, 68), Wiggleworks for primary grades (70), I use what works (74), confident and keep up (17, 69).

Technology Summary

Participants are using technology in their communication, teaching and research. Participants are also beginning to use websites, electronic journals and email and comment on what technology has worked well for them, and what has not.

Almost one-half of the participants (48%) are using department or unit websites and 26% of the participants are using personal or course related websites. Although participants are using websites and see the advantages of websites, they look to faculty or departments for development and maintenance of websites. Several participants (18%) comment that they are posting to electronic journals and 37% indicate they read or subscribe to electronic journals. Participants identify the strengths of electronic journals but also alert us to hard copy journals that are requesting a release for them to post on their websites. Participants are using email. For example, 100% of the participant use email to communicate. When asked about technologies, 36% of the participants give examples of what went well such as hardware, software and support from people, and what did not go as well such as the infrastructure and need for ongoing professional development.

FINDINGS - PROFESSIONAL DEVELOPMENT

Introduction to Professional Development

The Professional Development section of the findings reports only on the perceived professional development needs of educators in reference to the following two research questions: What do faculty members need to make technology an integral part of their teaching process to enhance delivery of instruction, and to facilitate development of knowledge, skills, abilities, including problem solving and critical thinking? What do faculty members need to integrate technology into all aspects of their research process including access to information, collection of data, analysis of data, and dissemination of results? Participants were asked what professional development opportunities they were involved with recently and what opportunities they would like to be involved with in the future. In responding, participants note their vision of professional development, and their interests and preferences. Participants describe a support structure that would enable their participation in professional development with regard to technologies and their vision of administration and leadership. The reporting of the Professional Development section of the findings includes professional development opportunities, infrastructure, leadership, and a summary. Each table of comments within the topics is preceded by a description of the comments. When quotes from participants are used, they are used for clarification, not priority.

Professional Development Opportunities

Focus or Vision of Professional Development

When asked about professional development, many participants comment that their vision or focus is on keeping up with their skills and keeping up in their field. Skill related, participants give examples of the need to remain current. "My credibility comes from being able to do what I am asking them to do so I dare not let my. . . skills diminish" (75). "We keep aware of state of the art technology, to know when to jump in" (62). Field related, participants give examples of how professional development is part of their jobs and their quest to gain knowledge and remain current. "Every day is a professional development day, not because you want it to be, but that's the nature of this particular job" (26). "Students indicate what needs to be changed, we are trying to keep current in areas that are changing drastically" (27). "Need to keep on top of development going on with other people in other places" (63). "Professional development is teaching teachers" (60). "Professional development is the opportunity to extend and challenge my thinking and growth related to my career and my responsibilities as a professor" (87). One participant summarizes with a vision of professional development. "The intrinsic reward to do a better job for my own research, do a better job for my own writing and teaching" (78).

Self-Directed and Ongoing Professional Development

Participants comment that professional development is self-directed and ongoing. Participants give examples of the need for self-directed practice and ongoing investigation. "I practice everyday. Still coming up short for what a . . . player should be doing" (75). Those directly involved in technology must investigate what is new, know what it is capable of, investigate any special requirements, and keep aware of the purpose (62). To keep up with technologies or to keep up in their field, participants learn from each other. "Talk with people, watch what they are doing, figure out if we can do it that way" (22). Participants suggest that they learn by giving and receiving information and from conferences. "Going to presentations, giving presentations, it's invigorating and informative" (36). Participants identify reading, reflecting and researching as part of their professional development. "Writing and research is professional development" (19). Participants also indicate their affiliation with professional organizations, and their work in the community and their work in their profession as professional development.

Professional Development – Community / Profession

Participants were asked about their use of technology in their community activities or service in their profession. Many participants are using the technologies to communicate, to prepare their materials, to deliver presentations, or to give demonstrations or workshops on technology.

Professional Development – Community

Of the 100 participants interviewed, 55% are using technology within their community. As noted in Table 46, participants give examples of using technologies to communicate through phone, email, and websites, to prepare materials through internet searches and downloading, and to deliver messages through media such as radio (3). Technology topics varied from electronic coding (16), to how the internet can help small communities (40).

Table 46

Use of Technology in Professional Development – Community

Preparation	Communication	Delivery	Topic
Prepare materials (1). Search internet (3). Download (32). Newsletter (48).	Website (8, 30 68, 34, 44). Email / phone (1, 24, 36, 37, 41, 45, 50, 55, 58, 66, 69, 79, 83, 90, 93). Information exchange (33, 52).	Video conference (23). Microphone (29). PowerPoint (plug in) (10). Things can go wrong (13).	Volunteer with graphics, spreadsheets (15). Coach coaches, give references to websites (17, 32). Paramedic course development (63). Guest speaker (87).

Professional Development – Service to the Profession

Of the 100 participants interviewed, 70% are using the technologies to reach out to provide service in their profession. As noted in Table 47, participants give examples of communicating through phone, email and websites, delivery through video/tele conferences, list serves, and online meetings, and modeling technology by being editors or co-chairs responsible for electronic collection, editing and distribution of papers. Participants are also working with schools, businesses and professional organization in the setup and maintenance of websites.

Table 47

Use of Technology in Professional Development – Profession

Preparation	Communication	Delivery	Topic
Preparation (1, 33, 71).	Email/ phone (1, 14, 15, 18, 32, 33, 34, 36, 38, 41, 42, 44, 45, 46, 47, 50, 52, 53, 58, 66, 69, 71, 79, 83, 85, 90, 93). Give webliography (4). WEB (30, 34, 74). In person (55).	On committees (17, 21, 16, 33, 41, 45, 51, 53, 65, 67, 68, 86). A/V conferencing (23). Microphone (29). List serves, home page links, distribution lists (49). Meetings on internet (72). Presenting at conferences, adjudicating (75). 40 speaking engagements a year (85). Guest speaker (87).	Editor (electronic). Co-chair research seminar (collect and distribute papers electronically) (9). With business – back/front of site (10). Professional organization – get web pages set up for members (11). With teachers from different schools (12, 21). Sub committee ATL (13). Dewey, distance education (16). Seminars, (40) (63, 64). Work on journals (48).

Several participants comment that they are using the technologies as a delivery mechanism, others are demonstrating the technology itself. For example, two participants use it in different ways. "About technology not with technology"(43). "Using technology, not about technology" (88, 99). Most participants are reaching out to their community and profession by either referencing or including technology topics, or by using the technology as a communication tool. Participants are also interested in their own professional development.

Professional Development – Selecting Opportunities

With reference to their own professional development regarding technologies, participants indicate that there is so much information and so many activities in the world that it is difficult to get to it all and that you need to be selective in what and how you participate in professional development opportunities. "There is no way in hell you can read it all" (42). "Need to look real hard for professional development opportunities that will nourish" (85). One participant indicates an appreciation of others filtering opportunities on the behalf of the users. "Somebody made the decision to move to different email, but they setup professional development to go with it—that was good" (65). To investigate their professional development needs, participants were asked about their previous, present and future professional development needs.

Professional Development Opportunities – Participated In the Past

As noted in Table 48, the participants indicate the type of activities they were involved in in the past. Participants could choose more than one type of activity. One-half of the participants (50%) indicate they were self-taught, 42% said they learned from others, and 32% said they took occasional courses.

Table 48

Participants Learning

Learning	Comments
Self taught	Self taught (1, 13, 15, 16, 23, 36, 39, 40, 41, 48, 53, 54, 55, 56, 60, 9, 63, 66, 67, 68, 70, 72, 75, 78, 80, 84, 85, 86, 87, 90, 92, 93, 100). Trial and error (3, 6, 17, 20, 25, 27, 29, 30, 38, 51, 57, 62, 71, 82, 89, 96, 97).
From others	Others (1, 3, 4, 9, 15, 21, 22, 30, 37, 42, 45, 49, 50, 80, 86, 99, 5, 18, 20, 24, 44, 71, 89, 98). Local support (7, 20, 28, 51, 59, 60, 64, 73, 77, 78, 83). Family (16, 33, 91). They do it for me (29, 32). Multiple person approach (62).
Courses	Occasional workshops (3, 4, 8, 10, 15, 16, 18, 21, 25, 29, 31, 6, 36, 38, 48, 51, 55, 58, 68, 69, 78, 7, 81, 82, 93, 94, 98). At point of need (35). Library courses (43, 53). ATL (46). Conferences (65).

Professional Development Opportunities – Participated Recently

As noted in Table 49, participants identify a number of professional development activities for technology they were recently involved in such as reading, researching, reflecting, attending and presenting at conferences, teaching teachers, participating in campus activities, making contact with colleagues worldwide both talking to people and through email, working with professional organizations, volunteering, helping colleagues, working with students, and enhancing supervisory skills. Participants also identify computer application such as the use of the internet, presentation programs, and digital hardware and software. Participants were then asked about their future professional development needs.

Table 49

Professional Development Opportunities Involved In

	Comments
Read/reflect/research	Read widely (40, 41, 59, 62, 64, 71, 27, 28, 68). Research (19, 64). Personal reflection on computer (33). Edit journal (73). Philosophy – ethics (87). Philosophical, not so much about tools (39).
Communication	Conferences (3, 5, 16, 19, 20, 21, 40, 41, 42, 45 46, 60, 64, 65, 68, 69, 70, 71, 73, 79, 93, 97, 98), speaking engagements (29), talking to people following up with email (16), delivering papers (3, 71), technical conferences (40), teaching teachers (60).
Resources, meetings, workshops	Department (4, 69). Library (14, 53). Recommended books, list serves, network (16). CRAME (82). Advisory meetings (47). ATL Sessions (58). CNS Orientation – amazing (58). Web pages with graduates (5). Talking—one coffee break can fill me in on a good month's work (47), conversation with colleagues (79). Workshops (42, 49, 59 73). Students (86). Give workshops (19, 34, 35). Bring in guest speakers (19). Posters (53). Help colleagues (45).
Global communication	Isn't anyone here, I talk to colleagues at other institutions (16). Contacts across the country (47), colleagues in different parts of the world (59).
Professional, community	Professional organizations (11, 41). Volunteer (46). M.Ed (31), coaching and supervision (15).
Tools	Internet (59, 64, 67, 3, 21, 4), presentation program (10, 11, 18, 23, 14, 52), WebCT (11, 49, 69, 86, 89), webpage development (48), bibliography tools (19, 37), e-mail from overseas (33), video streaming, digital, scanning (72, 64, 91), concept mapping (64). Administration/finance (30, 51, 61), management (30, 81).

Professional Development Opportunities – Participate in the Future "What"

Looking to the future, participants identify what they see as emerging and what they want to learn, or where they would like to seek professional development opportunities. Participants indicate they are looking for help with new and existing technologies. "Looking at leading edge whatever" (40). "Need professional development in technology, with what is now considered pretty basic stuff" (28). "Want to use the technology more effectively, more broadly" (27). "How do I find out about tools and templates" (17). As noted in Table 50, participants (25%) are looking to learn more about technology to be used in their research. As noted in Table 51, Table 52 and Table 53, most participants (84%) comment that they want to learn a variety of technologies such as office applications, technology for production, the internet, communication tools, and ways to incorporate technology in their teaching strategies.

As noted in Table 50, participants are also looking for training to help them in their research, for searching and communicating on the internet, and for using bibliographic tools and research analysis programs and digital anything, voice recognition software, e-magazines, concordance programs, and poster production.

Table 50

Future - Research Technology

Tools	Comments
Bibliography	Procite (46), EndNote (1, 6, 37, 44, 42, 58), data base to collect articles and references (12), concordance programs (73).
Library, internet searches, journals	Library sessions (7, 58, 14, 27), internet (1, 14, 57), online journals (27, 58, 66, 21, 28), ezines (34).
Analysis	Transcribing data analysis (58). Qualitative data analysis (1, 6, 7, 9, 36, 60, 7, 34). Quantitative data analysis (55, 40, 37), conceptual tool (33). Electronic surveys (15, 96).
Posters	Posters (1).

As noted in Table 51, participants are interested in learning about office applications such as word processing, spreadsheets, databases, presentation packages, websites, and production hardware and software from basic to advanced levels.

Table 51

Future – Learn about Office Applications

Opportunities	Comments
Word processing, spreadsheets, data base, presentations	Word processing – capability of my word processor (44, 52), advanced (7), page setup (33), assistant (33), auto correct, annoying macros (13, 28), fax from computer from hotel (33). Spreadsheets (7, 69). Presentation program (1, 5, 13, 14, 21, 27, 37, 60, 69, 71, 73, 77, 82, 89, 91, 94, 96, 97, 99), audio, video clips (86, 99), proxima (33). Filemaker (54, 38). Zip drives (44). Programming tools (15, 51).
Production software	Vprism (42, 12, 71), digital (11, 62, 73, 91, 94, 96, 22), story space (42), scan (33, 37, 97), clipart (1), hyperstudio (42, 60), video clips / manipulate graphics (15, 6), photo software (13, 39, 74, 85), javascript, applets (74), macromedia (63), video (36).
WWW	Web pages (12, 13, 15, 60, 66, 78, 77, 87, 89, 99), web tools (23), keep website current (5, 12), models of webpages (47), web searches (71, 74), web for beginners (73), web for research (5, 28, 33), how the web can work for us (9), critique web sites (14).

As noted in Table 52, participants are looking to improve their ability to communicate by learning to use technologies effectively with such tools as email, faculty servers, calendaring, and message management.

Table 52

Future - Communications and Information Processing Technology

Opportunities	Comments
Communication	Handle demands of email (47), connect to stakeholders, students, principals, cooperating teachers, coordinators, professors (15). Address books (74), get to faculty server (74), download (74), javascript, applets (74), calendar (33), manage messages (12, 33, 13), attachments (36), out of office options (37), get to mail from anywhere (38), chat rooms (69), voice recognition software (53, 69, 99), electronic surveys (15, 96).

Participants also indicate they want to learn to use technologies in their teaching. As noted in Table 53, participants want to investigate how technologies can be implemented with their teaching, with lesson plans that match Alberta Learning objectives (32), with the use of WEB CT, and how technology can be used in their planning and marks management.

Table 53

Future - Teaching

Tools	Comments
Teach	Use technology for teaching (12, 32), more training to use technology in teaching (31), second language learning software (24, 93), language labs (24), presentation software (4, 18, 21, 58), spreadsheets (3).
WEB CT	WEB CT (1, 15, 33, 65, 89, 93, 35, 80).
ATL	Learn from ATL rather than apply for a grant and hire work (17).
Management	Marks program (28, 42), learning management (80).
Internet links	WWW (1, 5, 10, 23), syllabus online (2), post case studies (26).
Conferencing	Audio / video (4, 77, 68).
Graphics/media	Media (18, 73), video streaming (49), midi lab (75), video (85).
Interactive textbook	Make it interactive (17).
Alberta Learning	Objectives (32).

Professional Development - How to Learn about Technologies

However, to know if technologies are applicable in their teaching or research, participants are asking for ways to hear about or see existing or new products and applications because they are so involved with their own area of expertise. When asked about becoming aware of technologies, most (79%) of the participants' responses were filtered into more than one category. As noted in Table 54, participants indicate that in the past they primarily learned about technologies by word-of-mouth, from colleagues, conferences, online communications, reading, and from commercial advertising.

Presently participants indicate they are actively seeking out information. "Seek it out because technology permeates everything I do" (72). Although participants are becoming aware of technology, there is still a need to get technology information pushed out to the people who "don't even know what they don't know." "Did not hear about ATL until after it would have been opportune" (34). "Unless a fellow researcher or teacher says have you seen this yet, or unless I'm at a conference and somebody is displaying it, then I'm not likely to pick it up" (74). Once one knows about the technology, states one participant, one can then look into learning and using it. "Happenstance. I don't purposefully pursue technology, but once I hear about them, I try to look into them" (96). One participant expressed enthusiasm over the possibility of hearing about a new tool. "I'd be there so fast you wouldn't see me for smoke" (43).

Table 54

Hear about Technologies

Category	Comments
Word mouth	Word of mouth (32, 78, 13, 21, 22, 26, 38, 28, 36, 67, 70, 73, 75, 76, 77, 80, 86, 94, 97, 98, 100). Husband (85, 89). Webmasters (91). Groups Discussions (12).
Colleagues	Colleagues (2, 6, 9, 12, 16, 18, 23, 24, 27, 33, 45, 48, 55, 71, 59, 64, 66, 74, 80, 81, 87, 89, 91).
Conferences	Conferences (2, 13, 72, 74). Show and tell (15).
Online	Email, list serves, internet (4, 6, 26, 31, 34, 36, 41, 42, 43, 44, 45, 46, 48, 49, 50, 51, 52, 53, 56, 57, 58, 59, 61, 64, 65, 68, 69, 70, 71, 72, 80, 81, 83, 91, 93, 97).
Reading	Journals (9, 75). Jan's memos (82). Newspapers (8, 12, 23, 32). Flyers, announcements, calendars (81, 22, 26, 28, 38, 41, 42, 44, 46, 49, 50, 51, 93, 54, 55, 61, 86, 96, 98, 100). Print (12, 34, 31, 63, 67, 68, 69, 70, 71).
Seek it out	Seek (5, 15, 34, 49, 56, 65, 72, 78).
Commercial	People send me programs (66). Buy software (32). Trial versions (34). Clients will tell us (62).

As noted in Table 55, participants want to learn from others with technology experience. However, participants who are well versed in the technologies are asking if they are offending colleagues when they quite naturally want to jump in and relate or promote new technologies or applications.

> I've been accused of running around with a solution looking for a problem. . . but what we want to say is there's so many things that are out there in technology, tell us what you're trying to do, and maybe we can help you do it better. (p. 40)

Participants who are well versed in the technologies need to rest assured that their input is valued. Participants want to be marketed to and sold on the use of computers from people with experience using it in their teaching and in their research and from people dedicated to the technology field. Several participants expressed the need to learn from others with experience using technology (90, 92, 17), and to talk to others in similar fields to find out what works (6). One participant brought up the need to be kept informed or in the loop of technology changes in the faculty (67), and another participant stresses the need for input on the allocation of funding (72). Several participants also perceive their need to learn new technology applications from questions brought up in this study. "Get to email from home or anywhere, I've got to try this, thank you" (37). Participants are looking for colleagues and others to help them, not with their research or teaching they are excited about, but with the technology. "Help them go one step more technically sophisticated than maybe they imaged themselves" (39). One participant states that once a perceived need is established, learning can be from a variety of sources. "I need to perceive the need first then I can learn in almost any fashion" (41).

Table 55

Marketing / Sales

Topic	Comments
Sales	Convince me that my current approach is not productive (79).
Awareness	Sell me on learning (like Mike C.) to make it really easy for me (18). Just as you pursued us for this interview, they ought pursue us with their vision of how we can better serve students and serve the community through technology (18). My inherited computer has software on it and I haven't got the foggiest clue what it does (67). All these icons come up, I have no idea what is on this computer, I type into it, use email, somebody showed me how to get on the web, that's about it, so there it is, all this money, it's wasted on me, you should have just gotten me a typewriter. I didn't realize (49). I think one becomes lazy when there are support people who are so capable, so I haven't had to learn some of the things that I perhaps should have (52). And how can I describe what I want to do. I do not have the vocabulary (7). I don't know how to use half the capability that's in even my word processing (44). Kind of need to be lead along (58). Need presentations on what is available (11). Best practices, what's new (65). Need an awareness of support tools, what's available (4). I don't know what that is (84). I didn't know, I will try that (41).

Once participants are aware of technologies or when they want to learn about technologies, they are quite specific about how they want to learn.

Professional Development Opportunities – Future "How"

When asked about future professional development activities, participants made suggestions on how they would like to learn or enhance their technology skills. Participants comment that they want to acquire technology information through presentations, and they want to participate in professional development through their research, their teaching, self-learning, through local events, through documentation and from the sharing of best practices from others.

Although one participant brings it to our attention that people are not looking for a technology solution to everything (68), another participant comments about the need to see the relationship between subject area, research and technology.

> Very interested in the development of the subject area that I teach and research in and its relationship to technology. The area within our department that is centered on instructional technology has made me aware of the ways it can be undertaken and I am certainly interested in that (3).

Participants are looking to people for help who understand pedagogy and course development (13) and the basics of their scholarly work (35), and who understand pedagogy as it relates to technology (13). As noted in Table 55, many participants suggest they want to be the recipients of marketing of existing and emerging technologies. One participant suggests a supermarket:

> Someone has to show me good examples and illustrations how technology might be used. A supermarket presented in a way accessible to me. I'd say, I could use that. I'd then need people to help me learn and develop the expertise. I have to see it to see how it would fit what I am doing (67).

As noted in Table 56, participants also state that they want to be sold on the technology through communications, information sessions and workshops on what is available with examples of how technologies can be used so they might see the application in their work.

Table 56

Promotion of Emerging Technologies

Topic	Comments
Promotion	Want two hours presentations on the latest available stuff for doing data analysis (50). Need presentations on what is available and how it can be used (11, 14). Overview session to talk about different software, what's available, what can be done, what are the possibilities (58). Show what's new (65, 67). Best practices (65).

As indicated on Table 57, many participants want to participate in professional development through their own research, through conferences as either a participant or presenter, and through professional organizations and from reading.

Table 57

Research

Topic	Comments
Research, reading	Paper presentations (7). Conferences (16, 49, 92). Once face-to-face contact has been established, electronic to fill in the blanks, get information, ask for things (15), national and international (39, 100). I inhale reading in my area (85, 87), e-journals (66), buy a book (19).
Professional Associations	American Educational Research Association (20), professional organizations (53). Journals (9).

As noted in Table 58, some participants want to teach themselves through manuals or trial and error and by teaching or showing others. Participants also support local events such as workshops and the library and university computer orientations, and opportunities to work with specialists in the multimedia lab.

Table 58

Self-Teaching

Topic	Comments
Local Resources	Access information far more efficiently (27), library workshops, one-on-one, for "everything you wanted to know but were afraid to ask" things that eluded me (12), library sessions (58). CNS Orientation – amazing (58).
ATL	Work with ATL to learn and understand rather than apply for a grant and hire the work out (17). ATL good idea but does not answer all the need (16). I love what ATL does, I go down once per session (47). Education needs a facility, not ATL that is part of extension. Need pedagogy type of information people are looking for (64).

table continues

Topic	Comments
Teach myself	Self-directed (87). Teach myself (65, 67). Doubt I will attend any formal...I will learn them as I need them (29). Learn on own (39). Read the manual, try it out. Base learning on my problem solving skills (62). Time to sit down with an executive summary of how to do things, key features (63). Play with it and get an understanding of what it is about (68). Not a workshop type of guy. Give me a manual, and I'll teach myself (75). Trial and error (11).
Teach others	Provider of professional development for others (85).

As noted in Tables 59, 60, 61, 62, 63, participants are quite specific about the quality and logistics of training events involving the technologies. Participants ask that trainers or teachers use their pedagogical and andragogical principles in their planning, design, delivery and follow up of professional development learning events.

Participants have logistic concerns asking for courses, workshops, and support to learn new software or gain overviews of new technology to be learner centered. As noted in Table 59 and 60, participants want small class sizes, homogenous groups, hands-on activities, interaction with instructor, and fast track courses. Some participants suggest the courses need to be fast one-half day courses with multi-offerings for people to choose times to fit their schedules.

Table 59

Courses – Logistics 1

Topic	Comments
Courses	Workshops, seminars (53, 54, 64, 66, 69, 72, 87). Group courses fine for introductory level (51). When you are starting from scratch for new software or overview (98) Pop in for overview (7).
Hands-on	Hands-on (78, 96, 86, 68, 3, 35). Self learning with guidance (informal) (11). Interactive (53, 86).
Face-to-face	Face-to-face (78, 68). Interact with someone who is interacting with the technology opposed to using the technology to interact with me (66).

Table 60

Courses – Logistics 2

Topic	Comments
Fast track	I like to learn fast in two hours or something (78). Workshops will fast track you in (65). Few days intensive workshop (91).
Groups	Homogenous groups (15, 12, 53). Waste half the workshop with somebody asking questions that you may know already (37). Hierarchical system – young guys willing to learn from younger guys, then work with people more senior, ageism thing (40). Small groups (12, 35, 51, 53, 68). Always nice to ask the person next to you "so how did you get there or whatever" when you get lost (7).
Time	½ day – give you the option to clear up your desk (54). Half day workshops, anything more I think you lose the people because people are not able to make the time commitment. Prefer mornings (31). Better in spring after teaching duties (11). Short workshops (15). Prefer one or two days all day because it's too easy not to go if it is a half-day (30). So I just don't have time for courses, like if they ran at 2 in the morning I might be able to do it (33). Like the library, same workshop these five days, pick one (50, 82).
Equipment	Workshops with projector (76).

Participants are requesting that professional development activities follow not only pedagogical but andragogical principles. As noted in Table 61, participants want a clear set of objectives. Participants also want to work collaboratively as they see the value of working with other students in workshops and interacting personally with an instructor rather than interacting with a technology. Participants want delivery to be hands-on and interactive. One participant summarizes with the need for fixed achievement / variable time learning initiatives with adult education designs. "Need the basic principles of adult education, they need to know how adults learn and apply that to their education designs" (10).

Table 61

Courses – Pedagogy / Andragogy

Topic	Comments
Pedagogy / andragogy	Make no assumptions of what I know (2). Hopeless teachers unless they have an understanding of pedagogy, basically they give demonstrations, and they go so fast you are left sitting there (8). There is not just one way for all, must pay attention to different learning styles (8). NOT – lecture, demos, or a guy flipping around the screen. Totally useless (38). Workshops – 2 instructors 16 students – trying to follow, working desperately to be on the same page as everybody else – I came out of there fried. Do not want someone grabbing the mouse and doing it for me (45). You are figuring out where's the on button on the computer and meanwhile they're on step five, just does nothing and then I come back to my office and my computer is totally different (69). Someone to help me where I am, not ahead, not behind (82). Workshops not helpful, people are too far ahead or behind, I am spinning my wheels or lost (89). Incremental learning, I've long ago given up on the notion that you can learn how to do one thing in one term (34). Not a one shot seminar type of thing (46). Cannot talk and show slides! Can't go downstairs, put people behind screens and say, here, okay goodbye now do it. People have no time and they are scared. There is a lecture/hands on component – but it still doesn't add up to anything. It's still not enough (13). It's too lock step, if you miss a step, you're toast (80).

As noted in Table 62 and 63, participants seek courses that are applicable or relevant to the work they do. Participants state that content in any activity or training initiative needs to be relevant with immediate application if it is to be learned and retained. For courses to be relevant, participants suggest taking their own project or data to a course or workshop to be completed within the course within a timeframe. "Could we bring our own data and have a website built in a day" (13).

Table 62

Relevance of Learning

Topic	Comments
Relevance, Application	Bring your grant proposal, we will input it all together. Same thing with posters and marks. Do it together with someone to troubleshoot (24). Take ½ workshop where you get the software, take it home. . . begin to play with it (19). Bring this, bring that, we guarantee you by five o'clock you will have the website! Otherwise doing exercises and going home, and start it, problems already—Oh forget it! (13). Leave with a presentation done for PowerPoint—when they train physicians, surgeons, psychologists, you go along with someone who knows what they are doing, they don't send them into surgery with a book (85). On the job (86). Customized in-service (73).

Table 63

Contextual – Apply Learning

Topic	Comments
Context	Research shows that when you teach something decontextualized, the transfer to the actual profession isn't strong because the people don't have time to work out the contextual variables once they get back – so we need to provide complex learning experiences that are highly contextualized (100). You have to be able to apply it (7, 97, 26, 10, 8), don't want to learn something in a vacuum (98), cannot learn decontextualized skills (5), use it or you have to relearn or self teach that takes time (18), unless someone needs to use it now, they won't have time to invest to learn how to use the technology effectively (40), workshops in Excel that teach you how to map stocks and put the interest in, I was really frustrated by that (41), no point in going to a lot of workshops unless I am going to use the stuff right away, if I don't use it, I don't remember it, then it would be a waste of my time, and my time is extremely valuable (57), two parts to software – mechanics and conceptual/analytical (44), use it or lose it (78). Need practical immediate value (46). Need to know, just in time (27, 5, 39, 92, 41, 74).

As noted in Table 64, participants see that it is the responsibility of the instructor to not assume skills, experience or levels of participants in the class and to be aware of differences and know how to address those differences. Instructors need to break away from their computer jargon and talk and explain with a vocabulary students can understand. They also suggest the instructor needs to use an overhead to display computer screens and the instructor needs to physically navigate throughout the room to help everyone keep up. Participants want instructors to have better facilitation skills to keep themselves on track and keep the class on track. They want instructors to better handle questions that typically hold up the class or divert the class from the objectives.

Table 64

Instructors

Topic	Comments
Teaching adults	Instruction from someone who knows it well and is patient and not steeped in their own knowledge and intimidating. We don't need a talking head (19). I speak many languages but not computereze…You have to be friendly and patient and you have to make me comfortable if you are going to teach me anything (33). You can't rely on people who are already experts, they go blah, blah, blah and you're still trying to figure out what the first blah – they assume too much (34). Someone who knows how to do it, to show me (66). Need to speak non-computer language (21). Talks me through it or shows me something, is able to teach at a level, that is not too advanced (28). Most techies are not very good teachers (5).

Professional Development Summary

Participants identify all areas of their academic and administrative work, their work in their community and in their profession, reading, practicing, conferences or training initiatives as professional development. With the vast amount of professional development opportunities available, participants indicate a need to be selective. To help users acquire technology skills, participants seek avenues of communication to learn about new technologies, the application of technologies, and best practices from colleagues and early adopters of technology. When participating in professional development activities, participants ask for the development and delivery to be based on adult education and constructivist principles such as relevance and timeliness. Participants indicate interest in professional development from very basic to emerging technologies, from office applications to teaching and research tools. Participants are suggesting that workshops, courses and any professional development activities, no matter how good, need follow-up. "The follow-up must be very specific" (98). "Tutors available after the workshop" (76). Participants suggest follow up can be implemented through formalized help, documentation such as "quick and easy written out steps," tools, and services.

Leading - Infrastructure - Help, Follow-up Help

Help – Documentation

As noted in Table 65, participants suggest documentation is important as a learning tool itself, and as a needed support for follow-up. Participants ask the people developing help to check their assumptions because so much help is developed without the user in mind. Participants are asking for manuals, frequently asked questions, and simple "how to" sheets of steps to be made available so users can access help when they need it. Help can be as complex as a manual or as simple as a colleague or staff member writing out a few steps for the user to follow. In addition to documentation, participants draw attention to the need for help from others.

Table 65

Documentation

Topics	Documentation Comments
Assumptions	Written materials – never make the assumption that the person using it has a lot of technology background (26). Manual should be written by a person who doesn't know how to use a computer, not by a person who assumes that you have this much knowledge, page 400 assumes you know the previous 300 pages (50). "How to" help sheets – practical (85).
Frequently Asked Questions (FAQ)	Well developed FAQ to keep on learning or ask a help desk person on the other end (15), Go to whoever made the program, look at their FAQ (46).
Crib Sheets	Take-away crib sheets (3). Better than my passport is my quick steps to getting on the internet (33). I'm a visual learner, what works well for me are things like handouts and guides. Ethnograph guide is good because it cuts through the garbage that's in most computer manuals and gives me very concrete, specific with screen captures, it's wonderful. SPSS – ten guides on ten different methods of analysis and you pick the one (35). Need problem solving manual (39, 92). Keep directions right on the scanner (62). Pop in for overview, get a printed document, manual, take it away and play with (7).

Help – Community of Learners

As noted in Table 66 and 67, participants learn from a variety of people including technical support people, graduates, undergraduates, colleagues and specialists—a community of learners. Participants express the need for a "cross fertilization across the university" (2). "How do I know about the guy in biological sciences working with similar graphics when I want to do something in graphics" (16). Participants also suggest local gatherings to learn about technologies, and people in the department becoming champions of processes to turn around and teach or help others. Help can be from formal sessions, informal sessions or online sources.

Table 66

Community of Learners – Contacts

Topic	Comments
Contacts	Ask the right person (26). Sit with someone who has done it before (9, 58). Work together (60). Contacts, friends, people (27). Need resource person I know I can count on (10). Need community of learners (19). Graduates (5), students (17). Meet with faculty (4). Small group 3 hour tutorial – very useful put on by colleagues (5). Work together and you share a machine, you learn some wonderful kinds of things (61). Talk to people and find out what others are doing, a little here and a little there (16). People from different areas – learning from their experiences, valuable sharing with other faculty members, helps with ideas (11). Colleagues, networking (16). Be involved in change projects (80).

Table 67

Community of Learners - Trainers, Specialists

Topic	Comments
Train the Trainer	Train the trainer worked quite well (30). From someone based in our department, physically. I want help when I need help, not like when courses are available. The person should be in the department like a secretary or APO (67).
Tutorials	Online tutorial for web development (47). First choice – prefer one-on-one tutorials (15). One-On-One tutorial sessions (58).
Specialists, Business	Help from specialists (64), one-on-one for "everything you wanted to know but were afraid to ask" things that eluded me (12). Need just in time seminars (there are identifiable points in the term where lots of people are going to be going through the same thing) (24). SPSS provides new information, they are a business so they are active. Workshop, manual. They have several locations for training, Ottawa, Toronto and they schedule different topics through the year (55).

Help – Hallway Help

Participants need help to learn to use the technologies. One participant suggests that it is not productive to learn without help. "Learning without help is not an effective use of my time" (86). Participants are therefore recommending the need for hallway help, a help desk, and house call help. As noted in Table 68, all colleagues use hallway help by asking their neighbors for quick verbal help at the time they need help, by having a colleague drop by for a few minutes to provide direction, by informal chats to pick up on tricks and tips, or by faculty working and learning together. Without hallway help or a support system, one user describes the feeling of isolation. "I do find that really really frustrating to be completely and totally on your own" (50). Participants describe their appreciation of hallway help, but draw our attention to their feelings of taking up too much of colleagues valued time, of some thirty-five of them going to five experts, for example (2). Participants are recommending a formal registry of faculty who can help, a help desk, and house calls.

Table 68

Hallway Help

Topics	Comments
Use of Time	Learning without help is not an effective use of my time (86).
Hallway Help	One-on-one help, help from colleague next door at 7:30 a.m. (61). Has to be one-on-one for people like me (8). Sit with someone who has used the program before (9). Use hallway help, buy a book, ask a friend, share a tip (19). I want to learn how to do that, can you teach me? So mostly I want private tutoring, just get somebody that knows how (22). One-on-one support. Want someone to come into my office and link by speaker phone to walk me through it – like yesterday. . .it took about 40 minutes (23). What I have found useful is to have somebody when I get stuck that I can prevail upon to ask a question or to show me how to do one specific thing, I am trying not to be too greedy, asking for people's time to do that, but it is what I really find helpful (25). Ask a colleague (39, 41, 54). Talk to someone who has done it already (79). One-on-one for questions (93, 94). Colleagues sharing (86).

Help – Help Desk Hotline

As noted in Table 24, participants support the need for a help desk or hotline. One participant was adamant that he did not want to learn by reading. "They tell me to read the book, and I think that's really, very insightful, I just want to smack somebody because that is a useless response" (59). Participants want help available whenever they need help on whatever topic or program they might be stuck on. Help is requested for horizontal or generic programs such as word processing, spreadsheets, data bases and presentation packages, and help is requested for vertical or specialized training programs such as research analysis tools. One participant indicated the need to investigate help from software companies (55). One participants expressed the need for a help desk for cooperating teachers in the evening and weekends. Help desk help can be a formalized help phone line or website with email, but it can also include a registry of people.

Table 69

Help Desk Hotline

Topic	Comments
Help	Help desk on demand (15, 43, 33, 7, 50). Too busy, want someone with me when I first starting using it, although not realistic, at least accessible on call phone support, too much comes up after a course (1). Enhanced help desk, faculty level, needs to be a network of resources 'cause not everybody is going to know how to do everything, and if you ask somebody they could at least point somewhere in the right direction, that would be very useful (25). Previous courses not so good because of no follow-up. I might call and say, is there another way of doing this, why is this happening, and then say, by the way, could you show me how to do this or that (33). Ongoing support. Need to get sufficient handle on the simplistic kinds of things I am trying to do on a regular basis (36). If we are encouraging staff or instructors to incorporate technology into the curriculum, we have to make sure that we provide as much access to technology as possible, help increase comfort level and provide one-on-one help, timely being the issue (51). Frustration has to do with time wasted to solve problems –we're here at such hours, need 24 hour hotline (37). Grapevine, I get calls or email (63). Consultant for particular needs (58).

Help – Registry

A registry of people with expertise and who are willing to share or teach others at a specific time or place would be a powerful communication tool for users. As noted in Table 70, it is suggested that it would save time as people wouldn't procrastinate if they knew who to contact (5), nor would they waste time learning by themselves (50). A registry would open up communication and access for users. In addition to wanting a help desk and a registry, participants also request house calls.

Table 70

Registry

Topic	Comment
Registry	I don't know whose responsibility it is to help (11), lack of communication of who does what (36), we are not made aware of resources (13), we need a central registry (18), list of resources would be great (35), do this by themselves, that's stupid, a complete waste of time, we need a collective knowledge, much more powerful (50), huge need for qualitative analysis software and support (37), availability of appropriate sort of people in the infrastructure (28).

Help – House Call

As noted in Table 71, more than thirty participants indicated they want house call help. Participants can see the value of house calls to increase their productivity—for a person to come in and help with a specific application or project, to come in and watch to improve efficiency, or to come in and make technical adjustments. One participant makes us aware that some people do not want to read to learn, they want a personal visit. "No, I don't want a list of steps, I want face-to-face, hand-to-hand, I want to have my private tutor" (22). Others, however, are redefining a personal house help call to include an electronic connection. "Want someone to come into my office and link by speaker phone to walk me through it - like yesterday C&S walked me through a complete change, it took about 40 minutes" (23).

Table 71

House Call Help

Topics	Comment
House Calls	Come and give a hand (39, 43, 45, 49, 50, 57, 68, 90). Help me at the moment I need it, probably a tad demanding, but I could say this week I have a PowerPoint presentation and come over at say 2 o'clock Wednesday (16). Sit with someone who has done it before (9). By observing what I am doing, saying "did you know you could do this this way" and that's helpful So that to me is the absolute best—in context and usually troubleshooting (33). If someone can come to me would be good (35). Someone to call and say listen can I borrow you for two hours. I need a consultant help one-on-one (37). Someone come in and work with me one-on-one and that's a possibility (46). Sit down at a tutorial, but they don't want to learn that way (40). We work in isolation so effective learning thing is for somebody to be in the room, to help me one-on-one (45). Need friendly person who likes us, who will answer our stupid questions (45). I'm an impatient learner, so I like to ask somebody, how to get started, steps missing. Side by side learning. I love house calls, I think it's a fabulous service and whoever came up with the idea should be congratulated because it works for me (49).
House Calls	If we're talking effectiveness, workshops are not effective (49). Better to go in and do it individually. Also handouts to lead you through, stage by stage. I think it's crucial to have somebody to get them over particular sticky points. (52). House calls for someone come to help us (64). Someone to come to my office, one-on-one (69). We need somebody here trained on it who could then teach it to the people because several of us want to know. Small groups so you can get your questions answered. Some of the work needs to be done one-on-one. Unless we have a technical support, an awful lot of this stuff just isn't going to happen or it will happen at such an extraordinary cost in terms of professor's wasted time (71). Tutors available after the workshop (76). Best way of learning is one-to-one, somebody to come in and show me how to do it. I will call friends, or I am willing to pay someone (77). Over the shoulder help (82). Hands-on, one-on-one (85, 89). Coaching. Mentoring for tailor made help. Want to team up with others (91). We need coaches, people who come to us at home as well as at the office (28). One-on-one for building your own web page (51). Ideal –capable person wandering around and talking and watching people and suggesting increase in production time (61). Phone someone to come (74). If it doesn't work, I want somebody NOW (85).

For participants, professional development is keeping up to date with their skills, and with their field of teaching and research. Participants want to participate in professional development on an on-going basis. Participants assume responsibility to learn on their own, and they like to participate in learning activities such as reading, research, reflecting, conferences, professional organizations, and courses. Participants also want to be supported through a help system of hallway help, help desks, and house call help. Participants also want templates and forms made available as well as services and support.

Infrastructure Service and Support

Participants identified tools, templates, and services that could be provided to help them with their use of technology. Participants also suggested ways tools and services could be implemented.

Templates

As noted in Table 72, participants identify templates that would be helpful to them in their work. Participants support the use of templates presently available and request ethics review forms, research applications for external and internal funding, tutorials and models for web page development, and templates for posters. Participants suggest the forms and templates should be better advertised and stored in an electronic filing cabinet that is easily accessible. However handy the templates and forms are, participants want ease of access and a user friendly process. Templates and forms need to be developed to be compatible with equipment and software, available both online and on disk, and simple to use with a set of simple help steps. Participants also want to know that the form or template needs to be online, and not just put up as a gimmick. Participants ask for forms and templates but ask that the developers explore their assumptions and make them end user accessible and friendly.

Table 72

Templates and Forms

Topics	Comments
Template	(6, 8, 9, 11, 12, 14, 18, 26, 31, 33, 34, 36, 37, 38, 43, 45, 46, 48, 49, 50, 51, 52, 56, 57, 63, 64, 65, 66, 68, 74, 79, 81, 86, 88, 89, 91, 93, 96, 97, 98, 99), filing cabinet excellent (47, 30). How do I find out more about tools and templates (17).
Forms Needed	Ethics review form (68). Research applications to get money from internal sources at the university, and forms where we have to apply to school districts for permissions, calendar change forms (69). Need model / tutorial for webpages (48). Poster templates (18).
Template / Form Suggestions to Improve	Template / Forms Process Improvement – Software upgrades to read templates and forms (74). Why not just give it to me on a disk (85). I want the form to work—not like raising a child you have to coax it to do what it is supposed to do (85). 194 error, why would they even invent something that had 194 potential errors (85). Make visible and inviting and use herd psychology with support and follow-up (18). Cheat sheets for templates (11). Can waste time (44). Some forms from the Dean's office are incompatible with any intelligent form of life. They put in routines and subroutines that make it impossible, can't move it....very hard to work with, someone trying to show off. Keep it simple (20). Simpler processes. . .is it done and conforms with technology as opposed to done in appropriate forms and in the right places...I worry about who makes those decisions (27). We oversell gimmicks... there has been a lot of requests for whatever, who the … would be requesting that? (29). Templates, it isn't always clear where those forms are or how to use them (9).

Tools

As noted in Table 73, participants identify tools that would be helpful to them in their work. Participants request a grade management program to manage and submit marks, multimedia tools, digital anything, centralized data bases, more equipment such as transcribers and projectors, telephone answering equipment, and virus protect programs.

Table 73

Tools

Topics	Comments
Marks	Grade management tool to manage marks and to submit to admin (1, 63). Need formula for getting weighted average (24).
Multimedia	Authorware, PageMill, HTML (63).
Digital	We need digital equipment (93, 99).
Database	Class lists. It exists in central administration, but I have to type it in, that's an example of all of these data bases that are not interconnected, they should be, but they are not (67).
Equipment	Need transcribers (71). Instructional resources downstairs has only one or two for the whole faculty, and that is extremely upsetting. And computer projectors, unless you get a good one, there is a very weak image (23). Dated equipment and some are just not fixable (26). Need telephone answering service as right now I am performing the secretarial function for about half of my calls (87). Need virus protect (82).

Support

As noted in Table 74, participants identified human support and tools that would be helpful to them in their work. Some participants are looking for local support, within their departments (67, 79). Participants want help or support when they need to develop posters, brochures, or slides, or when they are involved with scanning or conversions. Support is requested for horizontal and vertical software, for a centralized database, and for email address importing and updates. Participants are also looking for a collaborative support system from colleagues for qualitative research or a support system such as the

SPSS 24 hour hotline. Participants want to be supported in their initiatives, and they also want services provided for them.

Table 74

Support and Service

Topics	Comments
Service and Support	Need tools to support me (91). Huge need for qualitative analysis support (37). Collection of knowledge for doing qualitative research (50). For posters, brochures, scanning, slides (97). Poster support (61). Convert Mac/IBM – need online support at whatever level (1). Websites (79). Technology Center does not have the personnel, they referred me to external consultants. We need resources to support these new developments (79). Better off using horizontal programs that many know how to use rather than vertical software that very few people know how to use (7). Data base support (88). Support for learning programs (71). Update email address lists (54). SPSS 24 hour online technical support certainly useful (55).

Services

Participants value their time and request clerical, technical and application services. As noted in Table 75, participants want services to be able to take their information and ideas to help them with the design and development such as a poster, a presentation, or webpage setup. Participants can also see the value of having a service for the maintenance of websites. Participants want services for one shot things or things needed to be done yearly, and they want services for time consuming activities such as scanning to free up their time for teaching and researching. One participant notes the importance of delegating things such as website maintenance. "They didn't hire me because of my keyboarding skills, they hired me for my brain. I want to do the things no one else can do and let someone else do the things that someone else can do" (35). One participant also sees the need for word processing support. "Guys who type 10 words an hour are sitting there typing papers because we can't afford to get him a secretary—stupid" (40). Support staff should be doing more, we should be doing less (36, 40). Although participants are looking for more tools, templates, support and services, they do recognize and appreciate the help that is available to them now.

Table 75

Service

Topics	Comments
Production	Too much time on clerical activities, we're paid to do cognitive work and research (33). Poster –can't we just give the stuff and they will put it together, show you a mock up and you say change this or that, and they go ahead and do it (16). Posters (47, 68). We [researchers] spend far too much time doing these one-shot deals without any assistance (24). PowerPoint – if you can give it to somebody where you want breaks, what you want and I want blue, then they should be able to do it. One or two screens, do you like this design, and they would know things like contrast for different screens (16). Scanning and dealing with images (16). Setting up web pages for the user to edit (16, 40). Maintaining website not academic (7, 86). Need editor on staff, service to help people to publish . Maintenance of web pages – just give this to someone to change (16, 7, 68).

Support and Services – Recognizing People and Departments

When participants were asked about tools and services to help them use technology, participants identified several people that need to be recognized for their outstanding service and support as noted in Tables 76 to Table 78. Appreciation and utmost respect are extended to so many that give of their time and help with technology and this list is but a sample to date. Gary, Rena, Craig, Bob, Pauline, Darlene, Chris, Wendy, Allison, Richard, Adam, Gerry, Lana, Denis, Joyce, Al, Vladimir, Joan, Mike, university support services, secretarial work that is not recognized enough, adult education people, technical services, Gene's people, the library, Hank's people, administrative support people, secondary office, IT teaching support, DTE, and colleagues too numerous to mention. Participants are appreciative of every support and services available but see a strong need for expansion of people to serve the users.

Table 76

Recognition of People

Topics	Comments
Recognition of people	Gary is wonderful, I mean he comes. Can you put that in your dissertation that Gary comes and he is a very nice man (22). Gary has been great (28, 38, 41, 86, 76, 98). Rena. Gary. Craig is good. Gary is excellent, Bob is great. Pauline wonderful. Darlene. Chris and Wendy great help. Chris helps, Chris knows. Quick and good, I know who to go to (93). Pauline, Alison and Wendy provided a model, they had the technical expertise and were very very helpful. Gary and Richard and Bob have been very generous and kind (90). I know who Gary is and the times I've needed to call, he's been very helpful (73, 74). Gary always comes and straightens it out, a wonderful support. These people are key (69). Bob is enormously helpful, Gary is very patient and very helpful and 99% of the time they've got the problem solved (67). Appreciate Gary who can come to my office here if something is not working well. Gerry has been incredibly helpful (59). Gary, able to adjust to the level of the person he is working with. Great confidence in his assistance (10, 11, 18). Joan or Chris help (94). Vlad shows us how (98). Lana. Excellent support (18, 76). Lana, a step ahead of everybody all the time. She wants things to work. Joyce and others, our Avante Guarde (20, 66). Draw support from other administrators across the faculty, DTE, Al, Vladimir. (31). Mike there to help us, he has the knowledge, he knows what needs to be done (67).

Table 77

Recognition of Support

Topic	Comments
Recognition of support	Secretarial VERY knowledgeable (57). Support is wonderful (1, 20, 42, 32, 50, 57, 74, 82). Service and support people I have the utmost respect for (87). Commend the people (41). We have some of the best technical support on campus (56). Secondary office is very helpful (10). Software is more user friendly (10). University support of things like virus. Adult Ed people are up on it (89). Wonderful support we get from tech services...they save my skin, Gene's people or Adam, the library, extraordinary skills (88). Technical support for teaching, located down the basement, is superb (20). Good computer labs. Gene is constantly getting information to us (20). ITC very quick to respond (46). Prefer our current assistant (55).

Table 78

Recognition of Type of Support and Services

Topic	Comments
Quality of support	Secretaries need to be recognized (1). Adult Ed people do not get mad when asked the same question (40).You say Dear Denis, would you please setup a list serve with a password and about 15 minutes later you get a message saying, your list serve with a password is now setup. The most magical thing. This is the support service that would be perfect (16). I get quick response. Technical support people very good, they start where you are, don't overdo it with the jargon, friendly, accommodating and supportive (4). I'm being taken care of very, very well and I do appreciate it (53). No complaints...I think they work well and provide the best kind of support they can (70). Gary talks me through it or shows me something, is able to teach at a level, that is not too advanced (28). I always feel like I imposing on them, they don't make me feel that way. Every time I call, and if I call two or three times in one day, I feel boy, am I really a pain (67). Overworked but I sure appreciate them (50).

Need for Additional Services and Support

Although many departments, services and people are recognized for their outstanding support, participants also recognize that it is not always the person's main duty to provide help and those people are often over subscribed to. As noted in Table 79, participants are looking for further support. "It is really out of the goodness of their heart, and it is adding to their workload and their time demands. That's not really right. Need people in positions where they are devoted to supporting these types of needs" (50). One participant wonders about the best use of time, to pour energy into collegial help or churn out own work while others struggle (34). Participants appreciate the need and observe the need for improvement. "Could use more people - the 2 people - they are run off their feet" (83). "Wonderful but not enough of them" (79). "Secretaries are maxed right out" (69). "The existing people are very good, they're responsive and that should be noted, but it is difficult for them to spread themselves as thinly as they're spread" (48). "Mike, like he is a colleague when I have a question or something, but then if you were doing that too much, I mean, you'd be imposing on him, I want the help to be there when I want the help" (67). Participants also draw attention to graduates—in several short months they are gone (13, 7, 40). "Technical support, we keep losing them [students]" (54).

Table 79

Need for Services/Support

Topics	Comments
Overworked	Tech people overworked (66), no support (86), 35 of us to go to 5 experts, it's not going to work (2), need a lot more people (21), more support (25, 40, 27, 43, 50). They are overwhelmed, it seems to me, in a real hurry with 14 thousand computers to see in a single day (50).

table continues

Topics	Comments
Need for support	Learning trial and error takes time (12). We need someone on call. Some of our faculty spend a lot of time working with staff just helping with how to use a scanner, web page advice, but it doesn't help the faculty member. Don't want faculty members misused in these ways, because that's not what is going to get them their promotions, that's just the goodness of their hearts. And it is hard to say no and there is a real demand and a real need to have somebody give support, it really has to be within the department (5). Aggravating to get support (1). Time wasted to solve problems (37). Student information, cooperating teacher and school data base, it is a huge data base developed ourselves, but some of the stuff is hard coded so… you need a programmer analyst to come in and help you with that. Need data base support at the local level (7). Network administrators have not been trained to support academic staff who are our key workers, do not have a technology learning support person, need to change – do we want to support academic staff who are the instructors, professionals, sessionals in connection with the teaching, very important fundamental question (10). More, more, more. There is always a crisis situation that comes up (12). We don't have support in this faculty. We need resource people (13). Need own support person (14). Need a lot more (21, 25, 92). Prefer decentralized (67, 79).

Need for Additional Services and Support – Suggestions

As noted in Table 80 and Table 81, participants offer suggestions to increase support. "We have to invest heavily heavily heavily in support" (40). Participants suggest training people within the department to support academic staff, and obtaining specialists such as programmer analysts especially for databases within the department. Participants recognize an available support structure of faculty and staff, but insist that it needs to be a formalized list. "There is a lack of communication about who does what" (36). Participants suggest a central registry of people who are willing and able to provide support on what they need and when they need it. "A list of resource people, that would be really great, and I would be willing to be involved with that. You could email them a question" (35). Participants also suggest a need for more information on the availability of resources such as the Division of Technology. As noted in the tables, participants suggest standardization of equipment and software and an evergreening policy that asks technical people to support only certain years or models of equipment and software.

Table 80

Need for More Support – Standards

Topics	Comments
Standards	We need someone on a permanent basis. Need to understand what they are going to support (5). Draw a line in the sand and say this is what we support, recycle machines, provide loaners and telephone support (26, 76). We should be on one platform (60). If we could cycle and get new machines every 3 or 4 years on everybody's desk. That would really help with the technical support that could be provided. It is conceivable that someone goes out and buys an old laptop and brings it in - and our technician spends a whole day working on it. If we supply the machines, we wouldn't be in that situation (26).
Needs	Identify needs and bring in help. Be wary of cutting edge. (29)

Table 81

Need for More Support – Standards

Topic	Comments
Interest groups	We have people in our faculty to help (98). I don't know who has particular expertise in word and considers themselves a person that could help (81). My questions are stupid and I don't want to bother Adam or Vlad. Does John Doe in a certain department have expertise in? Need for informal support (81). We need to know who is using similar programs, or people of like mind so we can get it all working together (7). Need group of learners, not one person knows all of things, so list those contact people, then give them some credit for being on call for help, not the technocratic group, send me to someone working with Endnote (19). Need resource person list (39). Faculty of education computer users, troubleshooters, handbook, website (not website you might not be able to get to the website) rather than having it by departments, have it by problems (39). Who do I have to call and how do I call them and how do we schedule (45). Registry (50). I would like a list of names and phone numbers of "who knows what" (61). Need resource person list (92). I know where to go, but need a list to know who to go to for what (86). I know where to go if I do need support (64). Service needs when physically separated from our support person (44), across the university (2).

Infrastructure – Summary

To learn about technologies, the application of technologies, and to develop and enhance their technology skills, participants are requesting a multi-help system including paper and online documentation, formal and informal networks of supporters both in-person and electronically, available when help is needed. Participants are appreciative of their support people, but recognize the need for expanded services.

Participants rely on a strong support system to ensure access, to ensure technical support, training, and to provide tools and templates. While participants appreciate the help they receive, they are looking in the future for ongoing and expanded help, and they are looking for leadership.

Leading the Way – Professional Development

Participants are busy in their field and rely on technology specialists to lead the way and keep them updated on what is new and what is relevant. They also look for leadership from the department, faculty, and university. They expect support from policies and procedures, and they look for a strong infrastructure to support them.

Leading the Way – Pre-Service and Service Teachers

As well as looking for leadership, participants indicated they provide leadership to pre-service and service teachers. Although several (12%) of the participants interviewed indicated that pre-service teachers have technology skills, and that there are more important aspects of the teacher education program to focus on than technology, many participants (56%) identified technology areas they perceive to be important to the development of a teacher. As noted in Table 82, teachers need to be comfortable learning continuously from a variety of people and a variety of sources as technology evolves so quickly, and teachers need to effectively integrate technology with the curriculum. Teachers need to think of the internet and other technology resources as an expansion of their library. Both pre-service and in-service teachers need to think about multi-perspectives, to think critically of technologies, critique materials and equipment, question sources of information, consider gaps in access, consider issues, ethics, and the impact of technology. Teachers also need to use technology to decrease their time doing administrative tasks. Participants also indicate that they have a role to play in providing a vision and strategies to using technologies in the classroom.

Table 82

Leading the Way - Needs of Pre-Service / Service Teachers

Issue	Comment
Courses	Once they get out there, they'll be too busy to learn computers. We owe it to students (1, 3, 32, 36, 41). Think in hyperlinks (37). Make them comfortable (15, 46). Conversant (48, 52). Basics (25, 51, 55, 61, 86, 88, 89, 99). Teach them how to learn (36).
Integration	Our responsibility is the integration (7, 9, 11, 12, 14, 19, 21 29, 31, 39, 45, 47, 52, 56, 64, 65, 75, 76, 77, 80, 92, 93). Rethink understanding of what a library is in the 21st century (4).
Perspective	Perspective, not to get sucked into the hyperventilating (8). Do they have the will or the time (22). Need thinking skills before technology skills (24). Where are we are headed (36). So pervasive you can hardly be a teacher anymore without the computer (42). We don't all need to have computers at our finger tips (50). Gaps, issues of globalization (87). Implications of moving in different directions (96, 97). Censorship (37), critique electronic materials (14, 91). Discriminate (17, 21, 35, 71, 73, 85, 90). Impact (33).

Leading the Way – Faculty Members in the Lead

Participants suggest, as educators and researchers in education, they need to take a leading role in the integration of technology on behalf of pre-service and service teachers.

To lead the way, participants need to be discussing and communicating issues with regard to technology (23), by supporting pre-service and in-service teachers who are expected to have but do not have technology skills (36), by modeling (41, 57, 65), and by working with students (73, 95).

Leading the Way – Technology Specialists

As noted in Table 83, participants rely on the technology department, experts in the field, and early adapters to lead the way. Participants are interested in discussions with early adapters and specialists about issues such as the impact technology has on the field and on people. "Impact of technology on professional development and how it can reposition us in the field" (46). How technology shifts how people think" (62).

Table 83

Leading the Way – Technology Specialist

Topic	Comments
Technology Specialists	Division of technology—make sure it is accessible. Instead of them telling what they have available, should be asking what people want. We shouldn't have to contract out, that is my biggest frustration (15). Arbitrarily imposed, you can submit but you cannot have input (15). Division of technology should be cutting edge, pushing the envelope, want to try things, experiment, show people, instill love of new possibilities and new technologies (15). We want to be leading rather than following. (15). Support – must be responsive to user needs (15).

Leading the Way – Recognition / Support

As noted in Table 84, participants expect the university/faculty to take a strong lead in professional development by providing policies for release time, incentives and rewards for learning and using technology. The university and faculty need to take a harsh look at decisions such as turning educating of undergraduate students over to people like graduate students and to online courses, at the same time looking at how faculty could implement courses using technologies.

Table 84

Leading the Way – Recognition / Support

Topic	Comments
University need to recognize	Need course release time to develop technology skills (34, 58), more incentives (64, 96, 99), credit for student counselling (75), insatiable need for prestige and concern over emphasis on research and publication. . . clear pattern of professors avoiding contact with undergraduates (90), telling citizens, taxpayers and government to "send their children to us to be educated," but they are not going to have much contact with professors (90).
Disabled	Hearing tests on computer, captioning, voice recognition, voice transfer (1).
Learning	Flexible learning, alternative learning facilities (46, 63).

Leading the Way – Policy

As noted in Table 85, participants talk about the need for leadership with regard to policy. One participant brought up the need for the faculty and university to setup and maintain funding partnerships with profit and non-profit groups and levels of government with specific reference to the disabled (2). Participants brought up the need for policy with regard to alternative learning formats (46, 63). One participant is looking for direction on where the university is going with regard to technology and the obvious lack of financial support for the instructional technology unit (80). Many participants identify the need to persuade the upper echelon to support equitable technology sabbatical. It was suggested that technology be recognized in the yearly review process (86). One participant is looking for leadership to build a stronger interactive online presence (12), others are looking for discussions on the faculty's policy on distance delivery (91, 4, 5, 87). Participants are concerned with policies that address funding and recognition of faculty involved with technologies and its implications for practice.

Table 85

Leading the Way – Policy

Topic	Comments
Partnerships	(2).
Alternative learning formats	(46, 63).
Equitable support /reward for technology	(80, 34, 77, 64, 99, 96, 86, 34, 72, 13, 17, 19, 25, 36, 48, 58, 95, 96, 34).
Rewards built into review process	(3, 2, 13, 19, 86).
Funding – faculty	85% of respondents from Infrastructure heading.
Distance Delivery	Administration is obsolete, administration of courses needs to be online (91, 65) excited about distance to reach students in remote areas (4). Beliefs about pedagogy (5). Masters through distance, I think that is a travesty (87). I would rather fly out (87).

Leading the Way – Infrastructure

An integral component of leading the way is the infrastructure needed for the use of technology. "Technology is only as efficient as the structure that supports it" (66). Almost one-third (30%) of the participants did not volunteer a response regarding equipment, few (2%) offered positive comments "the plan is comprehensive" (4), "I am indebted to the faculty for giving me equipment" (29), but more than two-thirds of the participants (68%) commented that they were not pleased with the present policy of acquiring technology equipment. The 68 participants stated they were not in favor of the present system of acquiring equipment and that it is the faculty/department's responsibility to provide financial support for the purchase and maintenance of technologies in order for faculty and staff to do their jobs. One participant identified the issue. "There is a lack of university support!" (80). The need for full and equitable support for the purchase and maintenance of technology by the faculty is of particular importance because 68% of the participants raised the issue in the open comments section of the interview. These were all unsolicited comments.

As noted in Table 86, participants stressed the need for the faculty/department to make provisions for equipment, support and services. Participants want new technologies to test and use before they are rolled out (65), and participants want updated and available hardware and software (65), specific software for such applications as music writing or historical research (75, 83), smart classrooms and portable labs (2, 13, 20), and color printers, scanners, and digital equipment (41, 82, 92, 96). Participants request technology for use at home (1, 34, 54), on campus (68) and when presenting off campus.

Participants express their concerns over present policy that expects faculty to provide most of their office and home technology equipment/software from their own funding or from their own personal money. One participant states that the lack of technology is a deterrent to using technology (77), and many agree (3, 6, 10, 13, 17, 22, 23, 27, 34, 36, 67, 68, 79, 85, 96) that finding funding for technology is a "burden" (3). They agree that it is "bizarre that you are expected to pay for your own equipment" (50). Participants also validate the need to have technology equipment/software provided for them because they are expected to lead the next generation of teachers by example (6) and because they are expected to show how technology can be incorporated into the curriculum (51). Participants express their need to have the faculty provide and support technology, but they also provide methods to achieve these goals. Participants suggest an evergreen policy and a set of standards for equitable support. Participants themselves identify a need for an evergreening provision to keep up with wireless technology, with equipment, hardware, software, and tools to enhance research work and communications.

Table 86

Leading the Way – Infrastructure

Topic	Comments
Evergreen	Evergreen (1, 5, 9, 34, 48, 63, 67, 80, 85, 86, 99, 100). Contradiction, university wants but no money (78). Leap frog, black hole (82).
Hardware examples	Digital (12, 40, 94). Portable computers (4, 15, 19, 23, 50, 97). Zip (70). Video (20, 35, 40, 45, 68). Portable lab (26). CD (11, 24).
Software	Web (24, 74, 64). Word processing (72). Scheduling (30).
Communications	Telephone (1, 25, 76, 89). Hearing equipment (1, 24). Voice recognition (69, 93). Video (91, 9). TimbuckTwo, Fetch (15, 59).
Printers/scanners	Printers (12, 68, 69). Scanners (16, 37, 38, 68, 74, 77, 96).
Research	Bib program (45). SPSS (66, 93, 96). Transcriber (71, 74). Web (14).
Wireless	Wireless (26, 94).
Legalities	Access, licences (18).
Classroom	Every classroom needs projector and portable computer (40, 14).
Support	Wish we could give them state of the art (1).

Leading the Way – Infrastructure Suggestions

The evergreen policy would provide equipment/software and upgrades on a regular basis with continuous support. As noted in Table 86 to 90, some participants choose not to contribute financially (10, 17, 34, 36, 41, 67, 68, 79, 85, 96), and others suggest application to a specific pool of funding (41), or rental/lease (12, 51, 72, 87, 98, 3, 48, 58, 60, 62, 74, 83), and cost sharing (87, 56). Although participants call for standards to make the support of equipment/software more efficient (6, 26, 34, 52, 63, 64, 87), they also call for a rental/lease of a variety of systems for a variety of needs. "Fifty dollars for this machine, 80 dollars you can have this one, if you pay 100 you can have that one, replaced every 2 years" (21). "One size doesn't fit all" (28). "Some people need state of the art technology on a continuous basis, others do not" (27). Participants also suggest the need for loaners when your equipment is in for repair or if you need a specific system for a specific application (26). Participants ask for a central registry of what equipment is available throughout the departments and faculties for video, film, or digital that might be loaned (18). Participants also ask for more commercial software licences and licenses to electronic journals (18). Participants also address the issue of equity, to overcome the have and have nots on campus by asking for a review of the present policy that allocates funds to specific faculty only. Equipment/software/support should be provided especially when funding is not available through alternate sources such as grants, and it should be provided regardless of one's status or years of service. "You can't integrate technology in your classroom if you don't have the tools" (6).

Table 87

Leading the Way – Infrastructure – Suggestions - 1

Topic	Comments
Purchase concerns 68%	For faculty (1, 2, 3, 5, 6, 7, 8, 10, 12, 13, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 32, 33, 34, 36, 37, 38, 39, 41, 46, 48, 50, 51, 52, 54, 56, 58, 60, 62, 63, 64, 65, 67, 68, 72, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 85, 87, 89, 91, 92, 93, 96, 97, 98, 99, 100).
Type of purchase	Have at least same as students (65). Technology to test out (writing a paper and pencil exam and the exam disappears off the desk, what could happen if a network went down (65). Need equipment before professional development (72). Software licences (65). Secretarial staff, their work is not recognized enough for the output they do and the power of computers they deserve (7). Instructors, not permanent staff need state of the art (7). Home (1, 34, 54). Computers for everyone (46). Help grad students (51). Classroom. Central services to provide equipment such as video cameras – learn from colleges where it give free for education (2). New computers for labs (13). Wired classrooms (13, 20, 38). Update university classrooms and equipment such as video (2). Licences (37, 50, 96). Photography (38). Educational research (38). Color printers (41, 82). Concept mapping (50). Music writing programs (75). Historical research software (83). Digital (92). Scanner (96).

Table 88

Leading the Way – Infrastructure – Suggestions - 2

Topic	Comments
Evergreen	Administration needs to support evergreening lease (3, 48, 58, 60, 62, 74, 83, 12, 51, 72, 87, 98). Standards (6, 26, 34, 52, 63, 63, 64, 87). Don't all need the same equipment (26, 21, 28). Faculty chips in we chip in (56, 87). Financial pool to apply to (41). Loaners (26). Laptops with tuition for students (38). Planned obsolescence irritating, expensive, time involved to upgrade a pain (24). Spend money, it's obsolete (38). Software updates at same time expensive (25). State of the art is not where I am, technology is a means for me to disseminate, to get information (27). Need to resist paying for software that can't do anything more (19).
Equitable	Equitable supply of technology (34, 51, 32, 52, 54, 89). Equitable support (18, 26). Research grants–have / have nots (1, 5, 6). Sabbatical – at least buy new equipment. . .to at least get a tax write off (5). Need an equitable policy in this have, have not faculty (10, 17). University not supported me one iota (19). Incentive for staff (51).
Time off	Who is going to give us time off to restructure work load to do. . .course development. Colleges are committed to putting programs online (2).

Table 89

Leading the Way – Infrastructure – Suggestions - 3

Topic	Comment
Burden	Purchase our own computers is a burden (3). Dipping into my professional development funds and my own money, bizarre (6). Bizarre that you are expected to pay for your own (50). Refuse to purchase – PD fund is to develop through professional experiences, computers are a business expense (10). Buying your own stuff, that's horrible (13). Bit of PD money we get supposed to be for conferences (17). What the faculty gave me, doesn't do anything, I should give it back (22). Scanners, printers out of my own PD money (23). Suffering – faculty not being provided with equipment (27). Resent having to take out of own pocketbook (34). PD money not enough to even go to a workshop (36). PD funds for conferences, books, journal subscriptions, versus buying a computer – I choose to support myself where I get a greater bang for my buck (41). Don't want to beg, borrow or pay for myself (67).

table continues

Topic	Comment
	Offensive to purchase own computer (85). Not prepared to use my pd allowance (68). Up to my work to provide me with tools, I am not ready to pay my own money (79). 100% unwilling to pay for training (85). Model T computer, need equipment, software, hardware, we are mechanics without tools (96). Embarrassed with the hardware they have (7). Limits of machine do not allow me to expand (77). University wants us to constantly become more efficient using technology, but out of my base salary? (8). Frustrating to wait to download mail, cannot connect because of busy, or connect time is limited to two hours (68)

Table 90

Leading the Way – Infrastructure – Suggestions - 4

Topic	Comment
Teaching	Supposed to be teaching the next generation and we have antiques for computers, we have to beg for crumbs or chips, it's just insane to me, I can't believe it. Industry knows, they understand the value, you've got to have it, you can't handicap people and expect them to do their best (6). Encourage staff to incorporate technology into curriculum, but no assistance to do so (51).
Indebted	Indebted to faculty for giving me equipment (29). Department provides (54)
Sale	Who is using what, whose needs are what, how can we help, how can we support, what kind of training do you want, nothing, there is a total apathy about it, nonchalance, call it benign neglect (41).
Sales	One stop shopping, what is best to purchase, we need the information made available to us (1). I don't know what's available, what's good, what isn't (50). Need support in department (67). Technology people should keep us updated, when something new comes in they should see if you want it (76).

One participant describes the need for an infrastructure to be in place for faculty to work with technologies.

> Technology is only as efficient as the structure that supports it. If you don't have a good hardware support structure, then technology becomes very cumbersome for many people. Support is fundamental to the well being of the whole faculty's technology structure. They are the most important link. The structure has to work for faculty to be efficient. (66)

Leading the Way – Time Management

When asked about drawbacks or deterrents to professional development regarding technologies, almost all participants (85%) identified time as both their most important issue and their most valued resource. As noted in Table 91, twelve participants explain their overload for time with their research and teaching: "You even figure in walking time, time it takes to walk across campus"(35). It's like being on a treadmill" (70). "We are asked to do so much, there often isn't the energy, even if you have the will and the money" (34). Although most participants see lack of time as a barrier to their professional development, many of the participants see opportunities to reclaim time in the future.

Table 91

Too Little Time

Topics	Issues and Suggested Solutions
Time	Too much time in personal area and for the profession (35, 43, 65, 70, 72, 79, 98, 99). Mind is too full (33). Doing too much, not enough energy (34, 36). People have no time (13). Computers have made us all go faster, because we think we can all go faster, we've all taken on more and we can't (81). Working down from over 30 grad students (84).

As noted in Table 92, participants identify areas where they could regain time. To avoid distractions, one participant suggests flex time and flex work sites to take advantage of quieter times in the office, and time out of the office to catch up on productivity (32). Many participants (15%) look to leaders to legitimize equitable release time to learn and use technologies and for them to help others with technology. Participants are also looking for equitable financial support for sabbatical, equipment, and conferences to learn about technologies. One participant looks to voice recognition to help speed up input. Participants are also looking at assuming responsibility themselves to prioritize and reprioritize their time and commitments (9, 10).

Table 92

Equitable Recognition,Time and Funding

Topic	Suggested Solutions
Equitable Resources	Need leadership – recognition, equitable release time and funding (2, 3, 13, 17, 19, 80, 81, 86, 19, 48, 77, 72, 95, 56, 34). Recognize collegial help (34). Need to priorize and repriorize (9, 10). Less clerical duties (36). Supply new equipment (21, 57, 88, 96). Word recognition program (69). Get a lot of work done Saturdays, Sunday, evenings travel (32). Central registry of help (11, 35, 18, 50).

Participants identify trial and error learning as a waste of time. As noted in Table 93, participants offer suggestions. Courses should be short and scheduled locally at multi times during end of term with relevant content. Instructors or people who can help with technology need to be able to advise on both technical and course development (13). Participants suggest a twenty-four hour hotline of support to reduce the amount of time they spend seeking answers about technology. Working on a project in a partnership is also an activity that they feel they would more likely make time for. Participants also want ways to hear about the technology without taking away from their workday such as communications from technology people or early adapters to technology (50). Participants want to be sold to, marketed to, they want information about new technologies and the application of technologies to see if the technologies are relevant to the work they are involved in.

Table 93

Learning

Topics	Issues and Suggested Solutions
Learning	Trial and error takes too much time (12, 37, 50). Too much to learn, too little time (65). Need time to not only learn but do it (99).
Support	Need support (1, 28, 36, 37). Work odd hours, need 24 hour hotline (39). Need quick steps or one-on-one someone in my office to help me (33). Would not procrastinate if I knew who to contact (11). Funding conferences to get upgrading (56, 62). To take the time to find out what's available, what's really good and what isn't, is time not spent with students or writing or doing administration jobs (50). ATL two lists – not everybody is concerned with issues they are concerned with (50). Need pedagogy of technology people "you can use…but the advantage of this one is, or no, that's a stupid way of doing that" (13). Need to know what's available (50, 18, 49, 58, 13, 6, 47). Find a partner, you'll tend to show up (26).
Logistics, sales	Logistics: End of term (4, 30). Several options (15). Locally (56). ½ day (31). Quick steps (33). One-on-one help (33). Demonstrate projects and schedule people to see just as you pursued us for this interview, they ought pursue us (18). Need to share ideas (6). Posters, samples (47).

As noted in Table 94, participants suggest that help, training and courses can only be time effective if they are relevant to the work they do. "Just in time or a waste of my time" (24). "Time invested into learning has to result in payoff" (6). Some participants suggest that their productivity does not increase with technology because they do not use it consistently enough to get the pay back and suggest one needs to ask if technology really makes a difference before learning to use it (70, 72).

Table 94

Relevance

Topics	Issues and Suggested Solutions
Time, relevance	Just in time or a waste of my time (24). Value need to be worth effort (8). Relevance (41, 70). Interesting (59). Immediate needs (5). Do not delay implementation (7). Appropriateness (62). Practical value (46). Tailored (90). Applicable (79). Timely-spent a whole term making a webpage, now there is a program that does it for you (6). I need to understand best ways to use technologies for my research and for my students (12).

Although one participant finds email as a tool that increases productivity and is less intrusive in her world (28), many offer other suggestions. As noted in Table 95, to overcome the time needed for the quantity of email participants are dealing with daily, and to overcome the expected need for immediate responses to email, participants suggest university, faculty, and department websites with more information, a set of standard responses to draw from, withdrawal from list serves, a self help system for students, tips on how to handle the e-mail succinctly, and talking on the phone rather than keyboarding. Rather than e-mail, participants are suggesting the use of the telephone for complex answers, using voice mail accessible from anywhere, switching to online meetings (63), using more secretarial services for filtering (86), and using the cell phone (also known as self phone) to call individuals rather than places (89).

Table 95

Communicating

	Suggested Solutions
So much trivial stuff and a sense of urgency, sense of frantic (86). Email. Quantity, turn around time (84, 5, 12, 13, 22, 23, 84). Cannot do one-on-one comments with 120 students (69). Email more time (5, 12, 84, 22). Requests for advice (13). Overwhelmed with email student counselling (75). Expectation available 24 hours (50). Dissonance between immediate response to email and careful reflective thought (48).	Standard email responses "so happy that you are thinking about coming to our program, however, this is the way we do our admissions and you need to contact" (50). Students self serve (15). Learn to use effectively, succinct (2). Need an email traffic copy to direct (15). Use email for short messages, set dates, obtain information (20, 38). Get off list serves (30). When I'm here for email, I'm here, when I'm not, I'm not (50). Screen – important, urgent (86). Use group lists (8, 56). Use voice mail (23). Cell phone would increase my effectiveness (10). Dial into voice mail (30). If outputs complex, writing on screen takes hours so a quick phone call (55). Quick conversations solve issues right then (86). Use voice mail rather than email (23). Online meetings (63). Need less professors assuming secretary functions (86). Get [technology set up for] global (91).

As noted in Table 96, to increase their time effectiveness in research, one participant suggests that they need to read something only once, but read it well and create an online database of information from the reading such as themes, critical analysis items, and hot quotes. Time will be saved, not having to go back to read the article. To increase their time effectiveness in teaching, participants suggest the use of technology for distribution lists, course outlines, syllabus, marks management, development of materials, and delivery.

Table 96

Research and Teaching

Topics	Comments
Transcription	Losing tons of time transcribing (69).
Reading, writing	Compile databases online and into themes – I only have time to read something once, so I am going to read it well. Different colors to identify themes, build file of critical analysis and hot quotes, so I don't have to go back to the reading unless I want to check something for accuracy (4). Word recognition program (69).
Teaching	Use electronic course distribution lists for email (8, 56). Marks with technology (63). Courses online, buys you time, but not before (63). Given 120 ID names, the likelihood of me making errors is so high (50). Website with course outlines (8). Copy slide out of a textbook or draw a slide and use it in PowerPoint, it looks right, and it is right, but what you do freehand is not (40). Optical scoring (50). Drawings or slides in PowerPoint (40). Say go to this webpage and see information there (4). Optical scoring (50).

Leading the Way – Importance of Issues

Under the heading of additional comments, and from other unsolicited comments noted throughout the interviews, participants identified the importance of leadership to support collaboration to discuss issues relevant to technology and the dissemination of this information to support pre-service and in-service teachers. Participants also commented that advocating for issues relative to technology and learning was also part of the leadership role.

Infrastructure

As noted in Table 86, 68% of the participants brought up the issue of infrastructure. The infrastructure needs to be in place for participants to learn and use technologies. Of the 100 participants interviewed, 68% are adamant that the faculty should provide equitable access to technology and support. Participants are seeking communication with administration and the infrastructure group of people to voice their concerns and offer suggestions (13).

Need for Discussion

As noted in Table 97, several faculty members are asking for more discussions within the faculty to discuss issues, ethical dimensions, and the future of technology in education. "Discussion in the faculty needs to happen" (90).

Table 97

Need for discussions

Need	Comments/Topics
Love to get together with some of my colleagues (35) (37). Forum to get to know what their ideas are (27). Debate (8).	Discussion (87, 89). Philosophical issues (87).

Cocooning

Requests for more discussions going on in the faculty is based on a problem with cocooning. As noted in Table 98, eleven participants brought up the issue of isolation. Participants are not working as much publicly at the university. Participants are working at home because they experience less distractions, and they are working less with students on campus because students are more independent and prefer to spend less time at the university. Email has caused a culture shift for participants that is isolating. Participants are spending more time in their offices communicating electronically with colleagues with common interests across the globe. As participants gain the opportunity to print within their offices and become less dependent on others for help using software, participants are less likely to come out of their offices. "Everybody stays in their offices, closes the door, reads millions of emails, I find it much more isolating" (35).

Table 98

Cocooned

Topic	Content
Home	We work at home (8, 35). The new community is a global community with common interests (8). Local scene loses gravity (8). Network of scholars from different disciplines, know each other electronically (46).
Students	Grad students now very individualistic in their pursuits (8).
Email	Culture shift (12, 13,15). I don't talk to people anymore, just email them (29). Email cocoons us to our office. Need to guard against being a hermit (37).
Expertise	Isolating experience, as individual's capability increases, the need of interaction with people decreases (60). Isolation. Not having people interested in the same technology (76). Technology is reduce us to isolation (84).

As noted in Table 99, participants identify areas that need to be discussed at the faculty level. Topics for discussion include the definition of technology, impact of technology on learning, thinking, academic roles, entrance to B.Ed requirements, research, ethical considerations of technology, and the impact of commercialization like cell phones and globalization.

Table 99

Topic for discussions

Topic	Comments
Impact	On learning (24, 48, 69), environment (48), attention span (24, 36). Self-phones, you call the person not the place—children with cell phones, who is calling them [and when] (87). Globalization (87).
Thinking	Does it shift the way we think (62, 90), affects of distance education (82, 82).
Duties	Professors assuming secretary functions (17, 36, 33, 86), technical (48).
Entrance	B.Ed entrance, not technology but skills working with children (70).
Research	Permanence of websites (78), rigor of publishing online (87).
Ethics	Genetic cloning (82, 87), robotics (87), social glue (87, 82), genetic modified food (82), political issues (8), need for a philosophy of technology course (8), consequences of technology (90), ethics of email (48, 85, 88), definition of technology (1, 39, 63, 67, 78, 67, 99).

Leading the Way – Summary

Faculty members recognize their need for leadership as they provide leadership to pre-service and in-service teachers. Many feel the faculty is in a good position to investigate and recommend practices to integrate technology. Faculty members see their need to broaden discussions to include leadership for the disabled (2), alternative learning formats (46, 63, 80), online presence (12), support of faculty (2, 3, 13, 19, 34, 72, 77, 64, 86, 99, 96), support and teaching of undergraduates (4, 90), the role of academics to provide data but not maintain websites (86), expanded support services (30, 66, 86, 1, 37, 12, 2, 59, 28, 67, 79, 92, 67, 79, 37, 64, 39, 90, 91, 28, 71, 67, 86, 7, 13, 68), equitable access to learn and use technology (13, 25, 17, 19, 36, 48, 58, 95, 96, 34, 13), recognition of time on email (69, 84, 5, 12, 13, 22, 23, 84, 75, 50), and for the need for infrastructure hardware and software (1, 18, 6, 65, 40, 14, 57, 6, 7, 21, 96, 88, 16, 67, 6, 8, 19). As participants strive to learn and apply technologies, they are looking for leadership and policies for equitable access, training and support based on an evolving but reliable infrastructure.

Findings Summary

Participants are using technologies, specifically email in their communication. Of the 100 participants interviewed, 92% are communicating regarding non-course related activities, 100% with administration, 91% with undergraduates, 94% with graduate students, 100% with colleagues or professional contacts, and all participants have sent attachments electronically at least once.

Of the 100 participants interviewed, most participants (74%) indicate that they are using technologies to communicate with students, to develop and deliver courses and to integrate the technology with course content. However, when asked about integrating technologies with the course content, 47 participants indicate they are either integrating technology generally or specifically. Of the 100 participants, 67 are interested in using technology in their teaching and discussing the impact of technology on society in their classes. With regard to assessment, more than two-thirds of the participants (68%) indicate they are using technology in assessment such as sending and receiving attachments, however, a low number of these participants (13%) gave examples of integrating technology with their assessment strategies. In the area of instructional management, 32% of the participants are using technology.

Almost one-half of the participants (49%) are involved with qualitative, 18% are involved with quantitative, 22% are in both qualitative and quantitative, 3% of the participants are involved in specialty research, and 8% of participants did not select a research type because of other responsibilities. Most participants (81%) are using technology to search for information and ideas relevant to their field. Although almost two-thirds (64%) of the participants are gathering data for their research through the use of technologies, many are asking for new, better, and faster ways to capture data electronically. Almost two-thirds (62%) of the participants are using technologies to analyze their research data. Although 26 participants support the use of technology for analysis, several participants give reasons why not. Although 88% of the participants are using the computer for writing and editing, several participants explain why conceptual thinking and editing in hard copy is preferred. For publishing and disseminating, 70% of the participants are using technology.

Almost one-half of the participants (48%) are using department websites and 26% of the participants are using personal or course related websites. Several participants

(18%) comment that they are posting to electronic journals and 37% indicate they read or subscribe to electronic journals. Participants are using email. For example, 100% of the participants use email to communicate. When asked about technologies, 36% of the participants give examples of what went well such as hardware, software and support from people, and what did not go as well such as the infrastructure and need for ongoing professional development.

With the amount of professional development opportunities available, participants indicate a need to be selective. To help users acquire technology skills, participants seek information from best practices from colleagues and early adopters of technology. When participating in professional development activities, participants ask for the development and delivery to be based on principles of adult education and constructivism. Participants indicate interest in professional development from very basic to emerging technologies, from office applications to teaching and research tools. Participants are suggesting that workshops, courses and any professional development activities, no matter how good, need follow-up.

Participants are requesting a multi-help system including paper and online documentation, formal and informal networks of supporters both in-person and electronically, available when help is needed. Participants are appreciative of their support people, but recognize the need for expanded services. Participants rely on a strong support system to ensure access, to ensure technical support, training, and to provide tools and templates. While participants appreciate the help they receive, they are looking in the future for ongoing and expanded help, and they are looking for leadership.

Participants are looking for colleagues, departments, faculty, and the university for leadership and support in their quest to become conversant with the use of technology, comfortable with ongoing learning or professional development driven by technology, and for their quest to critically evaluate the impact of technology on education.

CHAPTER 5 – SUMMARY

The Summary chapter includes a review of the purpose of the study, the method used, and the findings. The Summary chapter also includes themes related to the findings; summary statements, recommendations and a section for reflections.

Review of the Study

Introduction

Technology is rapidly redefining the nature of work and high school graduates will be expected to be conversant with technology-based tools. This places a demand on teachers to be conversant and comfortable learning and using technologies. In turn, professional organizations, accreditation bodies, government departments, and principals and superintendents who are hiring teachers are also demanding that new teachers have technology skills. As such, faculty in departments of education have a critical role to play in helping both pre-teachers and active teachers gain these communication and technology skills. To fulfill this critical role, faculty members need professional development with regard to technology in their communication, in their teaching and in their research (Goodale, Snart, Carbonaro, 2002). Mandefrot (2001) also sees the need for educators to participate in professional development activities now to bridge the gap between the availability of technology and its use. Olcott & Wright (1995) remind us that we need to renew our commitment to our most important resource—our faculty. As a commitment to our most important resource, this study was implemented to investigate the professional development needs of educators with regard to technologies. Wilson and Berne (1998), who completed research in the field of professional development for educators, suggest professional development for educators can be more successful if educators drive the content and opportunities themselves. Given the need for professional development to be user-driven, this study was undertaken to investigate the professional development needs of faculty with regard to technology.

Method

The study used a qualitative approach. Three individuals, including the researcher, were selected to interview participants in the study. The interviewers had previous experience with research interviews, experience using technologies in education, and were individually involved in their graduate studies. Ethics permission was granted to proceed with the study. Permission was also granted to send invitations to 120 faculty members and administrators in a convenience sample. An invitation combined with a release form was developed and distributed to each person invited to the study. The release form was signed by the participant and collected by the interviewer before the interview started. The release form assured participants of the process and confidentiality of the research and their option to opt out of the study at anytime. An interview guide was produced with questions related to communication, teaching, research, and technology with an open question for comments from the participants. The literature review guided the development of the interview guide with input from three faculty members who were familiar with people and technology within the faculty. The interview guide was tested and revised. The interview questions and interview process were reviewed for editing after the interviews started. Data from the interviews was transcribed and compiled into a database for queries and analysis. A meeting was held between the researcher and one of the interviewers to confirm fields, entries and themes arising from the data and interview notes. Findings were reported based on questions on the interview guide and themes from the analysis. The summary statements, recommendations and discussions that followed were based on the findings of this study that investigated the communication, teaching and research needs of faculty members with regard to technology.

Summary of Findings

As noted in Figure 2, faculty members are using technologies. When asked what professional development opportunities they participated in to learn to use the technologies, participants indicated self-taught trial and error, help from others, and help from workshops and information sessions. From these professional development opportunities, faculty members have learned and are using technology, specifically email, in all of their communication. All (100%) of the participants in the study are using email to communicate with administration, and all (100%) of the participants in the study are using email in their research to communicate with colleagues worldwide. Of the 100 participants in the study interviewed, more than 90% of the participants are using email to connect with people regarding non-course related items, with students in their courses, and with the graduates they supervise. Faculty members are using technology in their teaching. Of the 100 participants in the study, 86% are using technology in their planning, 74% in their teaching, and 68% in their assessment. However, of the 74% who are using technology in their teaching, 47 give explicit examples of integrating technology into the coursework; and of the 68% who are using technology in their assessment, 24 give explicit examples of using technology as an assessment strategy. Less than one-third (32%) of the participants are using technology in their instructional management or administration of the course. Faculty members are using technology in their research. Participants self-selected the type of research they have been involved in.

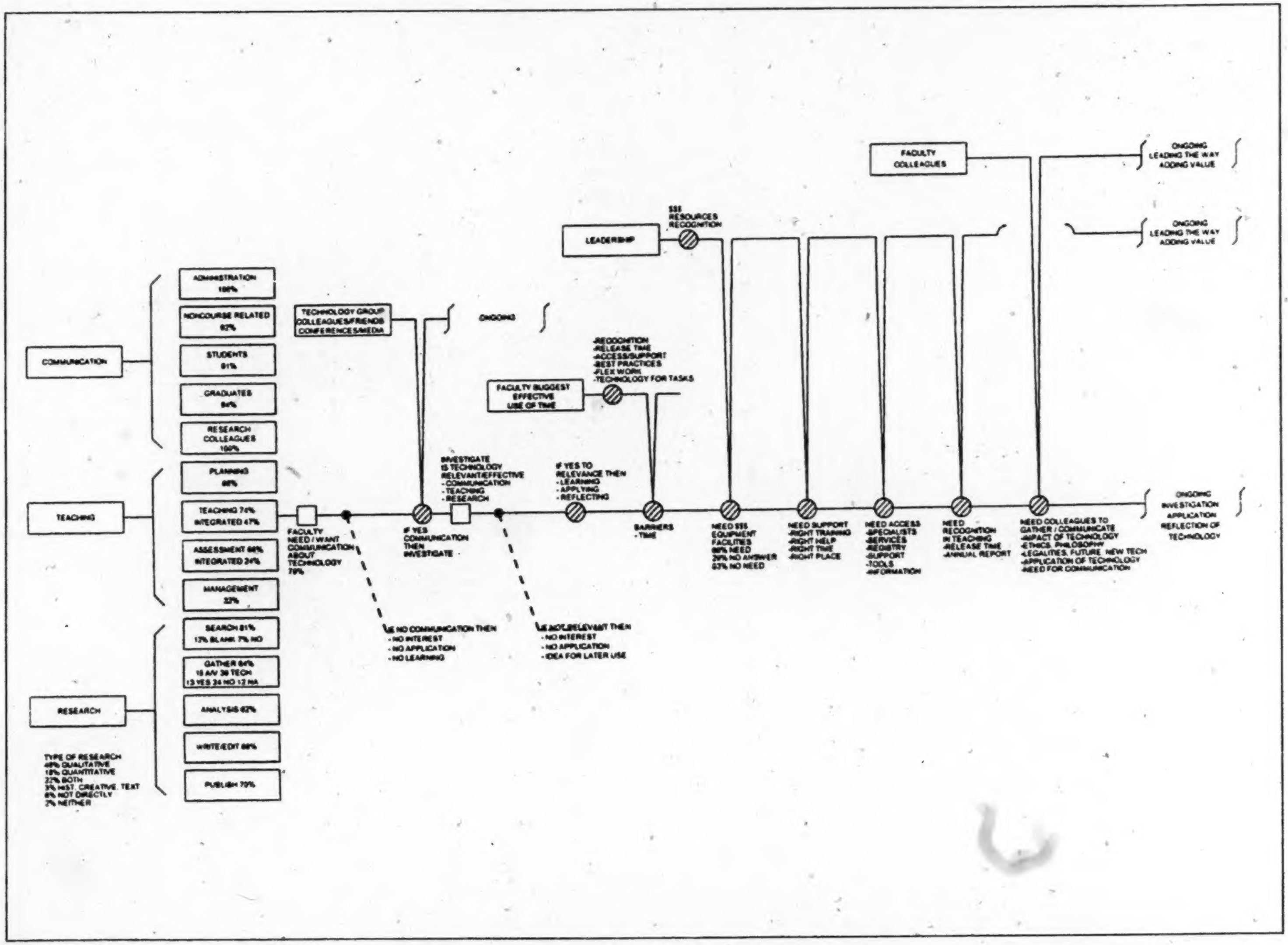
Of the 100 participants in the study, 49 are involved in qualitative, 18 in quantitative, 22 in both, 1 in historical, 1 in creative, and 1 in text. As some of the participants are involved with administration, 2 participants are not involved with research and 6 are involved but not directly. When asked about their use of technology in their research, 81% responded that they are using technology to search through the internet and library data bases, 64% to gather, 62% in analysis, 88% in their writing and editing and 70% in their publishing and dissemination. From previous professional development opportunities, most faculty members have learned to use the technologies in their communication, teaching and research. To proceed to learn more about technologies, participants identify barriers and enablers applicable to their work.

Participants want to learn about technologies. When asked about becoming aware of technologies in the future, most (79%) participants indicated an interest. However, to learn about the technologies, faculty members need to hear about or see the technologies. If the technologies can be communicated to the faculty members, then faculty members can investigate the relevance in their work or investigate how the technology can make their work more effective or productive. To participants, there is a plethora of technology on the market, but they have limited time to get to it. When asked about drawbacks or deterrents to professional development regarding technologies, almost all participants (85%) identified time as both their most important issue and their most valued resource. As participants are busy keeping up with their discipline and field of studies and learning from colleagues worldwide, they do learn about technologies, but rely heavily on members of technology groups or colleagues. More than 20 comments suggest that in addition to the media and conferences, they rely on early adapters of technologies to talk about and demo what is new and how it can be applied, and rely on others who have integrated technologies to share their best practices. If faculty members see a fit between the technology and their work, or if someone such as an early adapter or support person can see the fit and recommend it to the faculty member, the faculty member is then ready to proceed, to learn, and to apply their learning.

As noted in Figure 2, when using technologies, faculty members have barriers, needs and suggested solutions. Faculty members experience barriers such as shortage of time to work with technologies, lack of funding for new technologies and upgrades of existing technologies, need to learn, need for access to specialists and a support system, and need for recognition.

Although participants recognize that funding and support is limited, participants look to their academic and administrative leaders as enablers to help provide for their needs. Of the 100 participants interviewed, 69% request the need for equitable funding and access to technology equipment, tools, and supplies. The support participants are requesting needs to be the right training or help at their right time in the right place. Participants also identify recognition as a priority and key to equitable access to technologies and time to learn. Faculty members are looking for leaders to enable access to technology, training, specialists and support, and recognition. Academic members suggest technology is not just about the technical skills, and it is not just about the integration of technology in the curriculum, but that it is also about issues and the philosophy concerning technology and the impact on any area of education. To discuss these issues, participants request meetings with colleagues to create dialog, debate and direction.

Figure 2. Summary of findings.


COMMUNICATION
ADMINISTRATION 100%
NONCOURSE RELATED 92%
STUDENTS 91%
GRADUATES 94%
RESEARCH COLLEAGUES 100%
TEACHING
PLANNING 88%
TEACHING 74% INTEGRATED 47%
ASSESSMENT 68% INTEGRATED 24%
MANAGEMENT 32%
RESEARCH
SEARCH 81% 12% BLANK 7% NO
GATHER 84% 18 A/V 38 TECH 13 YES 24 NO 12 NA
ANALYSIS 62%
WRITE/EDIT 88%
PUBLISH 70%
TYPE OF RESEARCH
48% QUALITATIVE
18% QUANTITATIVE
22% BOTH
3% HIST. CREATIVE. TEXT
8% NOT DIRECTLY
2% NEITHER
FACULTY NEED / WANT COMMUNICATION ABOUT TECHNOLOGY 79%
IF NO COMMUNICATION THEN
- NO INTEREST
- NO APPLICATION
- NO LEARNING
TECHNOLOGY GROUP COLLEAGUES/FRIENDS CONFERENCES/MEDIA
ONGOING
IF YES COMMUNICATION THEN INVESTIGATE
INVESTIGATE IS TECHNOLOGY RELEVANT/EFFECTIVE
- COMMUNICATION
- TEACHING
- RESEARCH
IF NOT RELEVANT THEN
- NO INTEREST
- NO APPLICATION
- IDEA FOR LATER USE
IF YES TO RELEVANCE THEN
- LEARNING
- APPLYING
- REFLECTING
FACULTY SUGGEST EFFECTIVE USE OF TIME
-RECOGNITION
-RELEASE TIME
-ACCESS/SUPPORT
-BEST PRACTICES
-FLEX WORK
-TECHNOLOGY FOR TASKS
BARRIERS
- TIME
LEADERSHIP
$$$ RESOURCES RECOGNITION
NEED $$$ EQUIPMENT FACILITIES 68% NEED 29% NO ANSWER 03% NO NEED
NEED SUPPORT
-RIGHT TRAINING
-RIGHT HELP
-RIGHT TIME
-RIGHT PLACE
NEED ACCESS
-SPECIALISTS
-SERVICES
-REGISTRY
-SUPPORT
-TOOLS
-INFORMATION
NEED RECOGNITION IN TEACHING
-RELEASE TIME
-ANNUAL REPORT
NEED COLLEAGUES TO GATHER / COMMUNICATE
-IMPACT OF TECHNOLOGY
-ETHICS, PHILOSOPHY
-LEGALITIES, FUTURE, NEW TECH
-APPLICATION OF TECHNOLOGY
-NEED FOR COMMUNICATION
FACULTY COLLEAGUES
ONGOING LEADING THE WAY ADDING VALUE
ONGOING LEADING THE WAY ADDING VALUE
ONGOING INVESTIGATION APPLICATION REFLECTION OF TECHNOLOGY

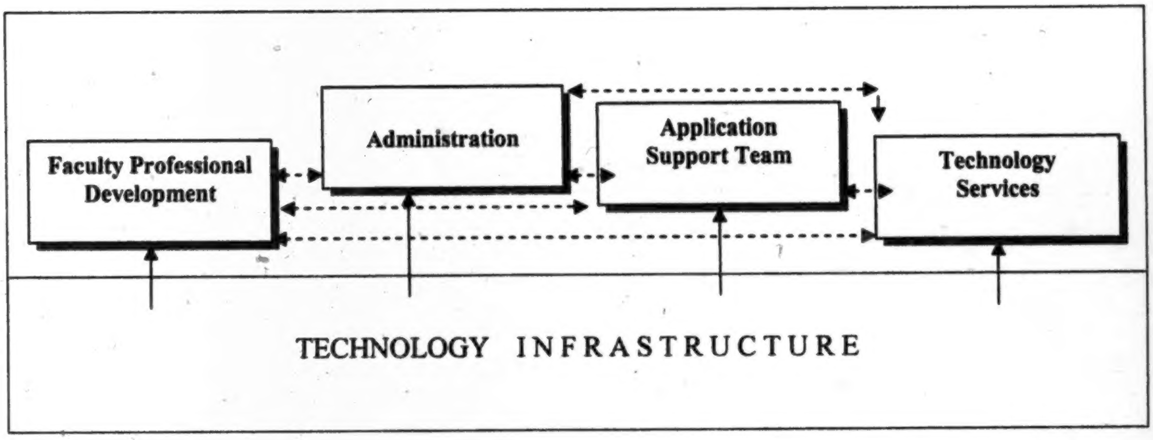
Professional Development Support Model Emerges

The professional development support model addresses the study's problem statements inquiring what do faculty members need to make technology an integral part of their teaching and research. From the findings, a conceptual model for professional development related to support emerges. Academic members identify "professional development" as self-directed and eclectic from going to and presenting at conferences, communicating with others using technology, attending workshops, to hands-on self directed learning. Under "leadership and administration," faculty members identify the need for a support structure for recognition and equitable access to technologies, and opportunities to incorporate technologies. Faculty members identify the need for help and follow-up assistance with "applications" as vital and ongoing. Under "technology services," faculty members identify the need for assistance from specialists and services for tasks such as printing, scanning, developing a poster, or developing and maintaining a website. Faculty members look to the technology "infrastructure" for research and development of technologies, stability, compatibility and scalability of systems, and technical support.

Professional Development, Administration, Application Support, Technology Services

As noted in Figure 3, professional development, leadership from administration, application support, and technology services rely on each other, but they cannot operate without the support of the technology infrastructure responsible for researching, establishing and maintaining technology systems and technical support (Carbonaro, Snart, Goodale, 2001).

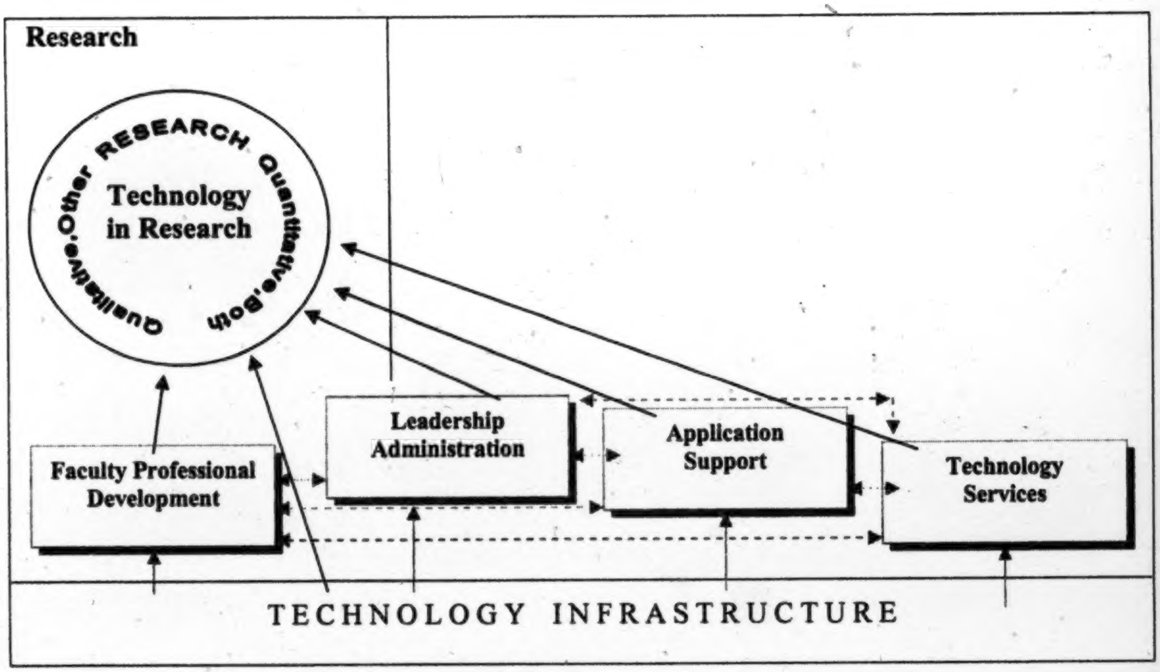
Figure 3. Professional development, administration, support and services.


Faculty Professional Development
Administration
Application Support Team
Technology Services
TECHNOLOGY INFRASTRUCTURE

Research – Support to Use Technology

Most of the 100 participants in the study use technology in their research including searching (81%), writing (88%), publishing (70%), gathering (64%) and analysis (62%), and are looking to enhance their skills, but many are looking for specific support for the internet, bibliographic tools, research analysis programs, digital anything, voice recognition software, e-magazines, concordance programs, and poster production. Faculty members also look for support of the technology for their communication in their research. As noted in Figure 4, faculty members who are using or will be using technology in their qualitative, quantitative or other research need to be actively involved in their own professional development, supported by administration, with available resources such as application support and technology services. All of this support structure relies on the technology infrastructure for development and maintenance of the technology systems.

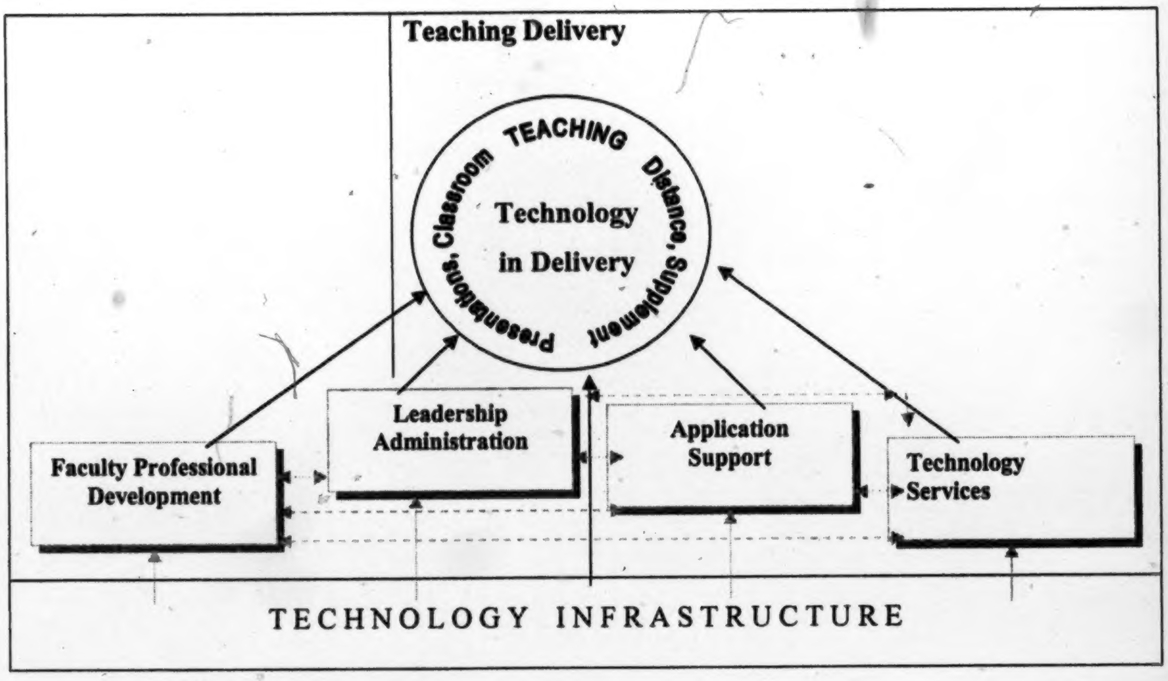
Figure 4. Technology in research.


Research
RESEARCH
Quantitative,Both
Qualitative,Other
Technology in Research
Leadership Administration
Application Support
Faculty Professional Development
Technology Services
TECHNOLOGY INFRASTRUCTURE

Teaching Delivery – Support to Use Technology

Most of the 100 participants in the study use technology for their planning (86%) and teaching (74%), and 32% of the participants use technology in their course management. Participants use technology to deliver distance education programs to virtual classrooms, as a supplement to traditional classrooms, and as a tool to deliver presentations and instruction. As noted in Figure 5, to enhance their teaching and presentation delivery skills using the technologies, participants need professional development opportunities, support from leaders and administration, application support, and tools and technology services, all of which rely on the foundation of the technology infrastructure.

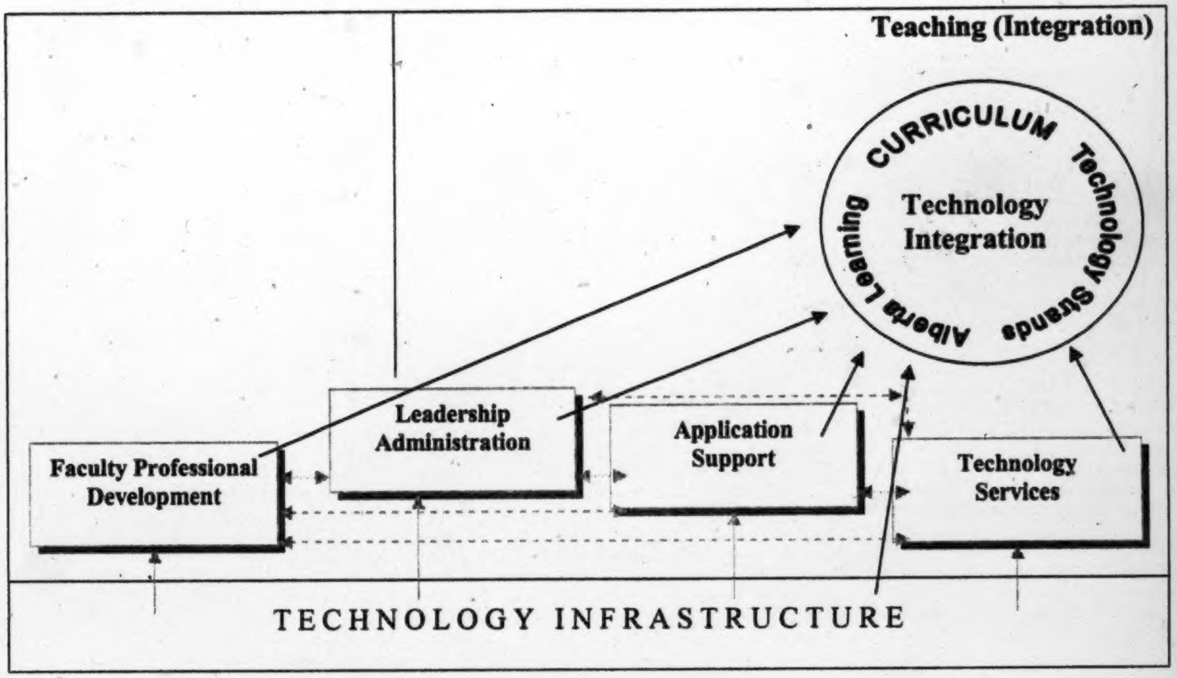
Figure 5. Technology in teaching – delivery.


Teaching Delivery
TEACHING
Distance, Supplement
Presentations, Classroom
Technology in Delivery
Leadership Administration
Application Support
Faculty Professional Development
Technology Services
TECHNOLOGY INFRASTRUCTURE

Teaching Integration – Support to Use Technology

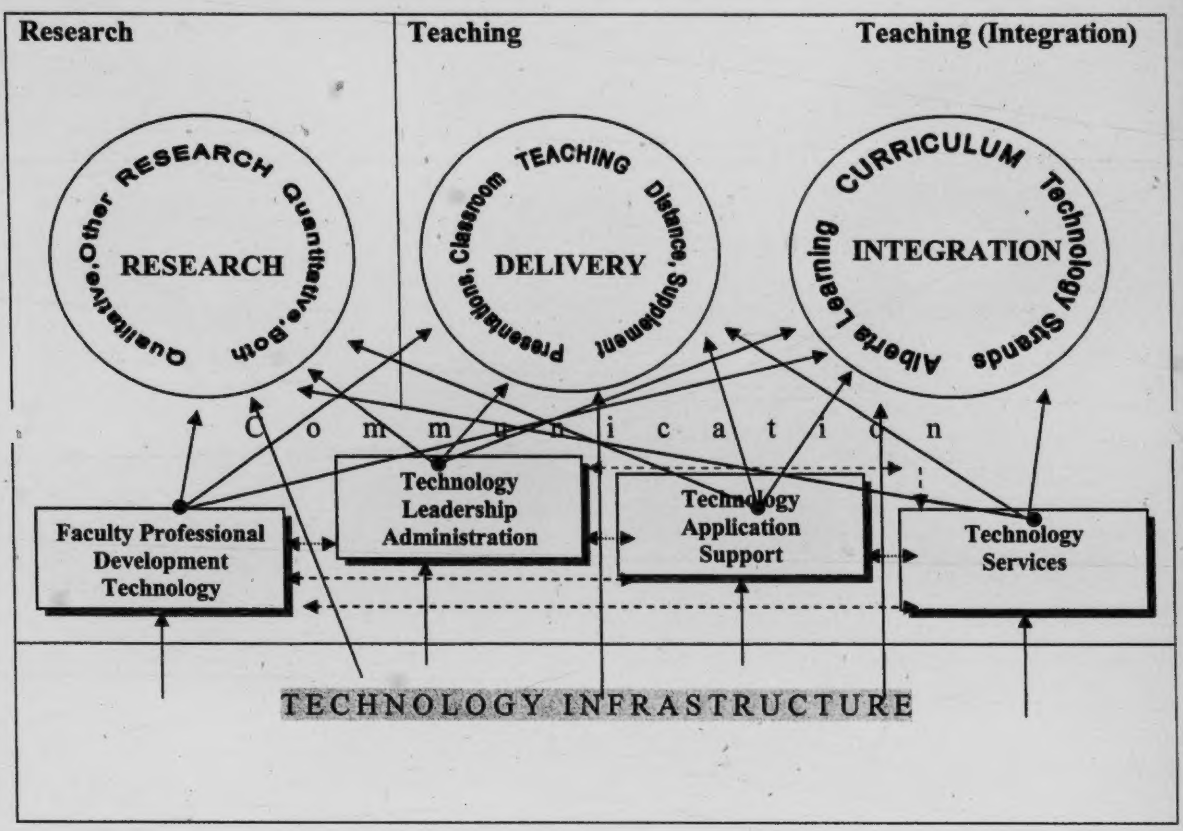
Since technology strands are embedded in the curriculum, since teacher standards regulating bodies are implementing policies to include technology (Rogers, 2000), since those hiring and evaluating teachers are favoring teachers with technology skills, and since students are in need of technology skills for the workplace (Alberta Learning, 2001), faculty members need support if they are teaching and modeling problem solving and the integration of technologies in the curriculum for pre-service and service teachers. As noted in Figure 6, faculty members who are using or will be using technology for problem solving and integration into the curriculum, need to be actively involved in their own professional development. Faculty members' professional development is supported by administration, with available resources such as application support and technology services. Professional development and its interdependent support system will only work if the technology infrastructure is in place to install and maintain technology systems and to provide technical support.

Figure 6. Technology in teaching - problem solving, integration.


Teaching (Integration)
CURRICULUM
Technology Strands
Alberta Learning
Technology Integration
Leadership Administration
Application Support
Faculty Professional Development
Technology Services
TECHNOLOGY INFRASTRUCTURE

In summary, these concepts serve to communicate that academic members who are striving to use technology in their research, and delivery and integration in teaching rely on their own professional development, support of leadership and administration, application support, technology specialists and services that are all based on or rely on a sound technical infrastructure. As noted in Figure 7, the many support structures are indicative of a systems view theory or a system of interdependence.

Figure 7. Technology in research and teaching – systems view.


Research
Teaching
Teaching (Integration)
RESEARCH
Quantitative, Both
Qualitative, Other
RESEARCH
TEACHING
Distance, Supplement
Presentations, Classroom
DELIVERY
CURRICULUM
Technology Strands
Alberta Learning
INTEGRATION
Communication
Faculty Professional Development Technology
Technology Leadership Administration
Technology Application Support
Technology Services
TECHNOLOGY INFRASTRUCTURE

Theories

Based on input from participants in the findings and from the theme related to support, theories for professional development involving technologies emerge. The interdependence and support required to learn and use technologies are relevant to a theory of systems view. The need for faculty members to investigate problem solving and integration of technology with the curriculum closely links to principles in andragogy and constructivist theory. How faculty wants to participate in professional development and how they want to be supported is based on principles of adult education. Together, these theories lend themselves to successful professional development interventions for faculty members to learn and use technology based on their input.

Systems Theory

Just as Moore & Kearsley (1997), Chernish (2002), and Knowlton & Nelson (2002) raise awareness of the need for systems theory when working with technologies, faculty members identify the same need. Participants need professional development opportunities to learn and use technologies, support from their administration, help with applications, and access to technology services. All of these support structures need to integrate with each other and all of these support structures rely on the infrastructure. The technology infrastructure group investigates, installs new and maintains existing systems and technology, and provides technical support. To maintain this system, every person and entity involved needs to be connected, thus the need for strong communication skills. The infrastructure is needed to support faculty members learning and using technologies in their communication, research and teaching. Drawing a comparison, the faculty members' infrastructure equates with Moore & Kearsley's need for systems theory or an interrelated and interdependent system in place to support the use of technology. "Technology is only as efficient as the structure that supports it" (66).

Constructivism - Andragogy

Teaching

Faculty recognize the need for pre-service and service teachers to become conversant with technologies as governments are implementing technology strands in curriculums, regulatory bodies and professionals hiring teachers are calling for technology skills, and careers are demanding a technology skilled workforce. Out of 100 participants in the study, 74% are using technology in their teaching, however just 47 comments indicate the integration of technology and promotion of technology as an interactive and problem solving tool. Regarding assessment, 68% of the participants indicate they use technology, however, there were less than 15 comments that indicate use of technology as an assessment strategy. A gap exits between using technology in teaching and integrating technology as an interactive and problem solving tool. A gap also exists between using technology as an assessment strategy and using it as a delivery or attachment tool. To change how teachers teach, Ross & Taylor (2002) suggest that the professoriate needs to model a change in habits and practices to principles of constructivism to integrate technology in the classroom. Ross & Taylor suggest the professoriate need to be the models for pre-service and service teachers. To enhance delivery of instruction with technologies and to facilitate the development of knowledge, skills, and abilities, including problem solving and critical thinking, many faculty members comment on their teaching with the following principles of andragogy and constructivism: Variety of strategies (17, 25, 98); relevant real-life content (what if scenarios (30), virtual field trips (64), case studies (89), analysis of video clips (40)); links to resources for self-directedness (20 comments suggest links to websites for learners to investigate); problem solving (14); reflection (11, 34, 15, 87); and collaboration (27% use technology to develop interaction). Integrating technology in the curriculum is an opportunity to support critical thinking, interaction and independent learning that are integral to the theories of andragogy and constructivism (Lane, 1996).

Learning to Use Technology in Research or Teaching

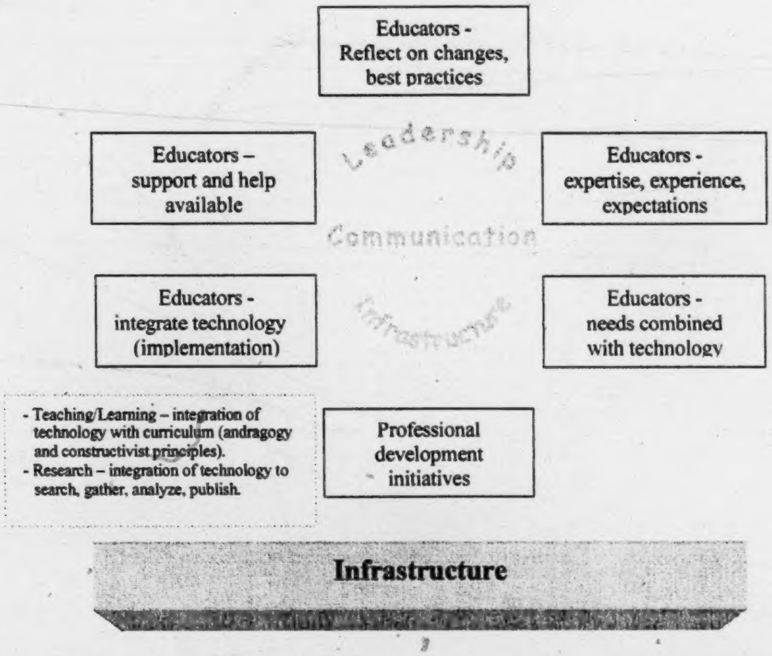
When teaching and research professional development activities are designed for faculty members, faculty members are demanding principles of constructivism to learn technology in context with their work and with their prior knowledge (Crawford, 1998). Supporting constructivism and the faculty members' recommendations are Wilson and Berne (1998) who conclude that professional development for educators is more successful if driven by the educators themselves. Faculty member participants demand a learner-centered approach in the design and delivery of their professional development activities, an approach Boettcher (1999) claims is relevant to both constructivism and andragogy. The learner centered approach includes relevance, interaction with instructors and students rather than with the technology, design and delivery tailored to specific learning styles, delivered in plain language, delivered individually or to small numbers of participants in homogenous groups, by facilitators trained to keep the class and themselves on task, in short courses offered at multi-times. The learner centered professional development activities need to be project based, fixed achievement, variable time (10). One participant summarizes with the need for instructors to treat learners like adults. "Need the basic principles of adult education, they need to know how adults learn and apply that to their education designs" (10).

Professional Development

Professional Development Cycle

The concept of professional development communicated at the onset of this study indicates faculty members begin with their expertise and experience, investigate how their needs and technology can be combined, participate in professional development initiatives, begin to implement the use of technologies with ongoing support, evaluate and reflect on the experience, and re-enter the process. Participants support this concept as they are using technologies in their communication, teaching, and research based on previous professional development opportunities, and they are interested in learning more about using technologies in the future by participating in professional development initiatives with ongoing support. As noted in Figure 8, findings from the study expand the professional development cycle concept at the beginning of the study. The expanded view includes the need for leadership for policies, recognition and equitable access to technology and training (see Tables 84, 85, 86), and communication within the interdependent system (see Tables 66, 68, 69, 70, 71, 79, 80, 81). Principles of andragogy and constructivism are included for both teaching and learning (see Tables 19, 93, 94).

Figure 8. Professional development – technology.


Educators - Reflect on changes, best practices
Educators - expertise, experience, expectations
Educators - needs combined with technology
Professional development initiatives
Educators - integrate technology (implementation)
Educators – support and help available
Leadership
Communication
Infrastructure
Infrastructure

- Teaching/Learning – integration of technology with curriculum (andragogy and constructivist principles).
- Research – integration of technology to search, gather, analyze, publish.

Broad & Newstrom (1992) estimate that less than 20% of the content in corporate training is used or applied on the job and that is why principles of adult education (andragogy) and constructivism are important. If professional development opportunities deliver the right content at the right time to the right people at the right place, in a delivery mode consistent with andragogy and constructivism and considerate of the individual learner, then the content in the professional development initiatives will more likely be applied to their teaching and research.

Professional Development Beyond

Participants outline what they want to learn and how they want to learn, but several were adamant that professional development for academic members be more than acquiring technical and application skills. As noted in Tables 97 and 99, professional development also meant gathering faculty members together to discuss issues such as the impact of technology on education, teaching, learning, society and research, and to discuss the philosophy concerning technology and education. Issues include copyright, intellectual property, ethics, filtering of data, validity and permanence of data, how technology repositions faculty in the field, and how technology shifts how people think. Faculty members want to discuss these issues because they need to communicate these issues to their pre-service and service teachers and others in the field of education to arm them with information that there is more to technology than technical and application skills.

Summary Statements

Based on the findings of this study investigating the communication, teaching and research needs of faculty members with regard to technology, the following summary statements emerged.

Communication

1. Faculty is using technology, specifically e-mail, to communicate with administrators (100%), colleagues (100%), students (91%), and graduates (94%), and with other people outside of the university regarding non-course related activities (92%).
2. Faculty need to see and hear about new technologies, applications and best practices, and about professional development opportunities (79%).
3. As faculty are using email, and as faculty need information to learn about best practices, new technologies, and professional development opportunities, email becomes a viable communication tool to meet their needs.

Teaching

Based on the findings of this study investigating what faculty members need to make technology an integral part of their teaching process to enhance delivery of instruction, and to facilitate development of knowledge, skills, abilities, including problem solving and critical thinking, the following summary statements evolved:

1. Faculty members are using technology in their communication with students (91%), in their planning (86%) and in their teaching (74%). However many faculty members are not integrating technology in their courses to facilitate problem solving, critical thinking and collaboration. Many faculty members are

also not integrating technology as an assessment strategy or instructional management tool.

2. Faculty members are interested in learning how to incorporate technology in their teaching and their comments suggest their need to combine technology with principles of pedagogy, andragogy, and constructivism.

3. With a responsibility to support pre-service and service teachers with regard to technology, faculty need equitable access, release time and recognition to investigate, build, and deliver courses or parts of courses using technology.

4. Although the 74% using technology in teaching opposed to the 47 who suggest they are using technology to integrate technology indicates a gap in integration, it should not overshadow the fact that over 90% of the faculty are modeling technology by communicating electronically with students and graduates. Although the 68% using technology in assessment opposed to the 24 comments that suggest the use of technology in their assessment strategies indicates a gap in integration, it does not consider that it might be a choice as many comments suggest a dislike for reading and marking online. Although 32% of the participants indicate the use of technology in instructional management, many support the choice of non technical because of class sizes, keyboarding skills, and because class lists and submission to administration are not fully electronic.

Research

Based on the findings of this study investigating what faculty members need to integrate technology into all aspects of their research process including access to information, collection of data, analysis of data and dissemination of results, the following statements were drawn.

1. Most faculty members are involved in qualitative research (49%) followed by a blend of quantitative/qualitative (22%), and quantitative (18%) research.
2. Most faculty members use technology in their searching (81%), writing/editing (88%), and dissemination (70%), however not as many faculty members are using technology in their gathering (64%) and analysis (62%).
3. Faculty members are interested in learning more about technology to enhance all of the components of their research process including areas such as bibliography, searching the library and internet, and analysis.
4. As technology continues to evolve, faculty members need to continuously investigate and evaluate the possibilities of incorporating technology with their research work in their searching, data gathering, analysis, and publishing.

Professional Development

With regard to professional development, the following summary statements evolved:

1. Faculty members identify professional development as self-directed and ongoing. Faculty members want to learn about technologies, however, their greatest barrier is time.
2. To overcome the lack of time, faculty members want early adapters to or adopters of technology to communicate to them what is new and any best practices and suggestions. Once faculty members perceive the relevance between technology and part of their work, they will seek professional development opportunities.

3. To overcome the lack of time, faculty members want professional development opportunities based on their needs, relevant to how they want to apply the technology, with trainers and support people who use principles of andragogy and constructivism when teaching, training, and communicating.

Infrastructure

With regard to infrastructure or an interdependent system, the following summary statements were drawn:

1. Faculty members realize that technology exists within an interdependent system. Faculty members also realize they depend on this infrastructure for support.
2. Faculty is appreciative of the technical and application support they receive, however they recognize the need for additional resources for follow-up technical and application support. Faculty members want the right support at the right time through creative ways such as demonstrations, directions taped to equipment, crib sheets, electronic or paper documentation, access to specialists, templates, production services, and access to a registry of support people that can be reached across time zones.

Leadership

With regard to leadership, the following summary statements emerged:

1. Support of this study by the faculty administrators and support of this study by the participants (120 invitees, 100 participants, or 83.3%) communicate their interest in and commitment to the professional development needs of faculty members with regard to technology.

2. To help faculty members lead the way investigating, integrating and evaluating technologies, faculty members need policies and leadership supporting equitable access to technology, support, professional development, and recognition. Faculty members need leadership as they provide leadership to pre-service and service teachers and to the field of education.

3. Faculty members look for support to initiate discussions of critical issues involving technology and education. Faculty members recognize an emerging cocoon environment where faculty can, from their office, write, print, communicate locally and worldwide, and access their electronic office files from off campus. Faculty members also recognize their need to move from meeting globally to meeting locally with colleagues to discuss and debate the philosophy of technology in education and critical issues such as the impact of technology on learning, thinking, education, and research.

Theories

1. Dependence on an infrastructure to support faculty members' use of technology supports systems theory. Findings confirm that faculty members need to work within an interrelated system with application, technical and design specialists. Findings expand on the systems theory as faculty members depend on leaders for policies and support for equitable recognition and access including hardware, infrastructure, and help with applications. Findings also expand the systems theory as faculty members look to early adopters for what is new and what are best practices, and to colleagues for discussions about the impact of technology.

Dependence on others and the infrastructure demands communication and collaboration skills.

2. Details of how faculty members want to learn or participate in professional development and details of how they would like to integrate technology in their teaching both reflect principles of theories of andragogy and constructivism.

Summary of Statements

Faculty members are interested in technology, are using email as a communication tool, are using technology in their teaching but are looking for strategies to implement technology using pedagogical, andragogical and constructivist principles to promote problem solving, critical thinking and collaboration. Faculty members are seeking recognition for time and funding to investigate, develop and deliver courses or parts of courses using technology. Faculty members need to investigate the possibilities of technology in their gathering and analysis in their research. As faculty member's greatest barrier is "lack of time," faculty members look to early adopters of technology to communicate what is new and best practices, and for help and services to use the technologies. In a move to discuss and debate issues relevant to technology and education, academic members are looking to meeting with colleagues locally. Academic members are interested in the integration of technology with andragogical and constructivist principles in their field, and they are also interested in learning in an andragogical and constructivist environment.

Faculty members realize how technology exists within an interrelated system and that to work within the system, they need equitable access, training, and support. Faculty need to investigate the integration of technology in their research, specifically in their gathering and analysis. Faculty members need to seek professional development opportunities to help learners use technology to become better problem solvers, critical thinkers and collaborators.

Recommendations

Recommendations for Practice

The following practical recommendations are offered for consideration:

1. Communication - The recommendation that emerges from all aspects of the study is communication. Faculty members indicate they communicate electronically with administration, students, and colleagues with common interests worldwide, without leaving their computers. Faculty members also indicate that they are less dependent on hallway help with computer applications, and they can now print from within their offices and work from home. However, academic members need to devise ways to purposefully gather to share ideas and best technology practices to lead the way in education and technology. Faculty members indicate the success of professional development regarding technologies is based on hearing about or seeing technologies from the media or early adapters, on support from academic leaders and administrators, on a network of contacts or registries of specialists, and ultimately on the infrastructure group that technically supports it all. Based on the need for faculty to communicate within this interdependent system, the implementation of multi-communication strategies in the department, faculty and the university is recommended to keep people connected. Multi-communication strategies could include electronic connections such as e-mail links to department/faculty/university newsletters, minutes of meetings or user

groups, and the use of project, course, and department websites. Colleagues could be invited as online guests in courses. Summaries, pictures, and examples of faculty using technology could be featured, technology articles and magazines could be circulated, services available could be communicated continuously, and a buddy system or mentor opportunity to work with colleagues using technology could be established. New faculty could also be introduced to other faculty using technology, conversely, new faculty with experience with technology could share their ideas.

2. Systems Theory - Faculty members and administrators seeking opportunities to learn or incorporate technologies in their teaching and research are advised to investigate systems theory that recognizes technologies are embedded in an interconnected system involving connections and reliance among individuals, teams and departments where collaboration with those involved is critical.
3. Recognition - With a responsibility to address the technology requirements set out in the curriculum, the need to help pre-service and service teachers become comfortable with continuously learning technologies and being creative to integrate technologies, administrators and academic members need equitable access to technology, release time and recognition to learn and use technologies. Those in positions of leadership are asked to implement strategies to recognize that the roles of faculty members have changed and will continue to change as technologies are incorporated in their work and in education. The implementation of policies and procedures is recommended to recognize academic members' achievements in the annual review process, and to showcase technology teaching

and research projects individuals and groups are involved in. It is also recommended that equitable funding for technology be established by such strategies as considering needs on an individual basis, especially for academic members who are unable to acquire funding for technology equipment and support through grants. Recognition and release time for faculty will influence how faculty can help pre-service and active teachers prepare for technology that will ultimately be of value to their students.

4. Discussion of Issues - As faculty and administrators communicate worldwide, print, and search for data within the confines of their office and work off campus, many feel cocooned or insulated from discussing issues with local colleagues. It is therefore recommended that faculty members be encouraged to invite colleagues to discuss issues and philosophies of technologies and the impact of technology on education in order to communicate research and issues to pre-service and inservice teachers and others involved in education. Issues include: Integration of technology in the curriculum, impact on learning, academic roles, influence on entrance into the B.Ed. program, on research ethics, intellectual property, copyright, validity and permanence of data, impact on globalization, and the impact of tools such as cell (self) phones on education. It is with discourse about ideas, best practices, ethics, legalities and philosophical questions that their understanding of technology in education will grow.

5. Professional Development Opportunities - Those involved in planning and implementing professional development opportunities need to consider the needs of administrators and faculty members, and principles of adult education and

constructivism. Professional development opportunities need to be aligned with the participant's needs. When designing and implementing professional development opportunities, principles of adult education need to be included: Content needs to be relevant and "just in time or a waste of time" (24), concepts need to be linked to previous learning, events needs to be offered at multi-times, to small groups interested in the same application, to groups who are at relatively the same level, in a variety of formats such as a "bring your own data and build a website in a day" (13), in various locations such as online, or in a lab, or in a faculty member's office, with interaction to learn from the instructor as well as from colleagues, from instructors or facilitators who follow adult education principles such as talking in "plain language rather than computereze" (33), who also have enough assistants to ensure everyone is at the right place at the right time. The instructors need to be open to interaction and to ensure follow-up support.

6. Androgogy, Constructivism - It is recommended that faculty members set a goal to explore how technologies can help foster interaction, problem solving and critical thinking in the courses they are responsible for teaching. Faculty members are also challenged to investigate how teachers are or could be integrating technology in their curriculum. It is recommended that faculty members explore their use of, and teachers' use of principles of andragogy and constructivism in their teaching. Andragogical and constructivist principles include learner centeredness, relevance of content, self-directedness, linking of resources to learners, reflection on experience and knowledge, collaboration and interaction

between instructor and students and among students. Lane (1996) supports the investigation of how technology can be used to support critical thinking, interaction and independent learning that are integral to the theories of andragogy and constructivism.

7. Research – It is recommended that academic members continuously investigate and evaluate the use of technologies in their research as new technologies are constantly evolving and improving in the area of searching, gathering, analysis and publication. It is also recommended that professional development planners seek out the needs of faculty members with regard to technology when developing professional development initiatives for research, as the specific needs of the academic members continue to change.

8. Time - As lack of time was identified as the greatest barrier to implementing technology, it is recommended that administrators, faculty members and those supporting the technologies implement strategies to make the most of their time and the time of others: Unsubscribe to list serves, work at flex times at flex work sites, obtain release time, use voice recognition software, become involved in professional development activities that are relevant and based on adult education and constructivist principles, do not waste time on self-learning when help can be obtained, have follow-up support available, have a faculty and department website that can handle generic inquiries, have a database to go to download general responses to generic inquiries, have a self-help system for students and student teachers, and an electronic marks management system compatible with administration. Participants also suggest the use of a telephone call rather than an

email as speech can be faster than keyboarding and can be more precise with complicated issues, a data base to enter summary of readings, loaners when computers are in for service, and loaners of equipment for off site trips.

9. Support - Although faculty are grateful for the help they receive, they recognize there can never be enough support. It is recommended that faculty members receive timely responses in either in-person or electronic format, from people who are versed in adult education principles, who treat people with respect and tolerance and communicate at the level the person is at, be novice, intermediate or expert.

10. As other faculties begin to implement their own professional development programs with regard to technologies, it is recommended that they reference this study to gain insights into faculty members' needs when making technology an integral part of their teaching and research.

Recommendations for Further Research

After analyzing the data and themes emerging, and after further readings and research, the following recommendations are offered for further research.

1. Replication of this study is recommended in other contexts such as with other faculties of education as other universities might serve a more geographically scattered population, or might be combined with a college with less focus on research, or a university that focuses on distance delivery. Replication of this study is also recommended for other disciplines to learn how others apply technology and develop professional development initiatives.

2. As professional development interventions have been implemented in response to this study, I would recommend a follow up survey to see if these interventions are meeting the needs of the participants with an open-ended question to ascertain any specific needs or concerns, or sharing of best practices. One major intervention is the work of leaders with extensive experience in both technology and curriculum development working with small groups of faculty members with common interests to learn to apply technology in their work. A second intervention is the establishment of user groups open to anyone interested in learning about areas such as digital technology and digital practices.

3. As many academic members are not using technology in their teaching or assessment strategies to support problem solving, critical thinking or collaboration by incorporating technology, and as faculty members are asking to be kept informed about new and emerging technologies and applications, it is recommended that further research is needed to investigate specific needs of faculty and to inform faculty members of technology possibilities.

4. Although this study defines what faculty members want to learn and use, and how they want to participate in professional development, I recommend further studies to ascertain what faculty members in other departments of education are doing in their professional development. This recommended study is also in response to Dutt-Doner, Larson & Broyles (2001) who contend that there is very little research available on how faculty members want to participate in professional development initiatives.

5. Ongoing studies are suggested to reveal how technologies are being used by administrators, faculty members, students at the university, student teachers, teachers, and students. Ongoing studies to reveal how others are using technologies will help individuals realize how much they know and how much "they don't know what they don't know" (74).

Recommendations Summary

Recommendations indicate faculty members' greatest barrier in their professional work is lack of time. Therefore, faculty members look to early adopters and colleagues to learn the new technologies and best practices. Faculty members need to be collaborative when working within a network of administrators, specialists, technicians and supporters. Recommendations include the overall need for communication as the use of technology exists within a large interconnected infrastructure. Faculty members need to learn in and to teach in technology environments of pedagogy, andragogy and constructivism. Faculty members need to gather to discuss issues relevant to the field of education. Whenever technology is being acquired, or whenever professional development opportunities are being planned for faculty, faculty members need to be involved, as successful professional development opportunities are driven by users themselves.

Implications

As we examine faculty as adult learners themselves, we begin to see professional development to integrate technology as an opportunity to transform the practice of teaching at the academic level, and to serve as a model to pre-service and service teachers to meet the needs of their students. We also begin to see the advantages and concerns of using technology in research. Understanding the challenges faculty members face and how their needs change will help those responsible to lead or coordinate professional development initiatives.

Reflections

Communication

The focus of the study was on investigating the needs of participants with regard to using technology in their communication, teaching and research, and the findings were reported including the use of technology, future needs, and barriers and enablers. With a need to interact with colleagues, to see and hear about the technologies, to have vertical support from academic leaders and administrators, and to gain horizontal help from the application team and technology services, a need is created for communication. What is interesting, is that the enabler to using the technologies is communication and communication is based on relationships and relationships are based on people. The study was all about technology, but the theme emerging is all about communicating with people. "The challenge. . . is not to produce more technology. . . the communications industry will take care of that," (Moore, 1993, p.10) the challenge is to build relationships with each other, to share best practices, to work collaboratively as technology exists within a large infrastructure, and to support teachers who are integrating technology in their teaching. The challenge is also for faculty members to remain current in their field through research and collaboration, and to gain leadership and support to investigate the impact technology has on education and education's impact on technology.

Technology Mediated

On reflecting on the use of words in the study, the phrase "technology mediated environment" was meant to mean using technology to form a connecting link, or to use technology as a medium in a research or teaching environment. However, as the findings emerged, I found the term "technology mediated" could also be used as term to intervene in a dispute. The phrase, "intervening in a dispute," could have been applied to academic members who wrestle internally with the use of technology, asking if the time learning the technology results in value added, if the task of using the technology could be contracted out to others more proficient, if their overuse of technology is infringing on their time doing scholarly work, and if technology could reduce processes in research, administration and course management resulting in more time for their academic role. Academic members described some advantages and hindrances of using technologies in their research, from a broader search capability to lack of standards in search criteria and less standards in refereed data, between ease of gathering data electronically to a limited audience, from a human error and speed reduction in analysis to a rigid analysis, from self-publishing on the internet to a need for site maintenance and issues of copyright. Faculty members were also looking at mediating points of view through discussions with colleagues on a scholarly level including philosophical, ethical, legal, and practical issues relevant to the use of technology in their work, in the development of policies, and in the field of education. As academic members internally reflect on the use and value of technology in their work, and as academic members challenge colleagues to discuss technology values and issues to enlarge their vision of technology in education, "technology mediated" becomes an alternate term.

Technology as Glue

Academic members are involved in different disciplines or fields, with different teaching and research interests such as policy, boards, teachers, parents, students, gifted children, English as a second language, deafness, brain functions, disabilities, library, elementary, secondary, adult education, measurement, literacy, counselling, learning, instructional technology, special education, culture, leadership, music, physical education, and curriculum, to name but a few. One participant generalizes that although each faculty member or small pockets of faculty members are involved in different fields, with different expertise, with varied technology skills, separated geographically in different towers and buildings, with different professional contacts globally, with different professional organizations and groups, one interest that can bind faculty members as leaders in education is technology. "One thread that could tie all of the departments together is technology. If we were all involved, we could see a lot more of each other, working at the same goal, but from different angles" (76). Although academic members are independent, they have stronger similarities than differences as faculty members are interested in how technology can be incorporated in their research and teaching, technology as a process not end result, and the impact of technology on learning and the impact of technology on the whole area of education. One participant sees the value of academic members bringing their views together, and I recommend that faculty members and administrators of all departments and disciplines make a concerted effort to bind together and become the leaders of technology in education by sharing ideas, best practices and issues. Could this vision be generalized to use technology as the glue to work collaboratively with colleagues, departments, administrators, and faculties of education nationally and internationally?

REFERENCES

Alberta Learning. (2001). Technology. http://www.learning.gov.ab.ca/ict/ http://ednet.edc.gov.ab.ca/ict/ictfront.asp

Anderson, T., & Garrison, D. R. (1995). Transactional issues in distance education: The impact of design in audio teleconferencing. The American Journal of Distance Education, 9(2) 27-45

Armstrong, R. D. (1998). (In press). Faculty strategies for learning to teach at a distance. (Doctoral dissertation). University of Wisconsin-Madison, Madison, WI.

Armstrong, R. D. (2000). Faculty strategies for learning to teach at a distance with instructional technology. DEOSNEWS. American Centre for the Study of Distance Education at The Pennsylvania State University. http://www.ed.psu.edu/acsde/deos/deosnews/deosnews11_1.asp

Armstrong, R. D. (2002). Faculty motivations for learning to teach at a distance with instructional technology. University of Wisconsin-Madison http://www.bsu.edu/teachers/departments/edld/conf/motivation.html

Banathy, B. (1995). Developing a systems view of education. Educational Technology. http://www.gwu.edu/~et/banathy.html

Barker, W., & Dudt, K. (2002). Results after two years of preparing teachers for the digital age (PT3) grant on a state university teacher preparation program site. Proceedings of the Society for Information Technology and Teacher Education, USA. p. 1496-1497.

Barry, C. (1996). Training the Next Generation of Academic Researchers to Operate in an Electronic World. SIG ENET Roundtable Presentation: AERA Conference April 11, 1996 http://www.radix.net/~reimann/enet/96/barry96rt.html

Bates, T. (1995). An Interview with Tony Bates. Campus Computing & Communications. Media Resources Network. http://www.cc.ubc.ca/campus-computing/oct95/tonyinterview.html

Bates, T. (1995). The Future of Learning. Paper presented at the Minister's Forum on Adult Learning, Edmonton, Alberta. http://bates.cstudies.ubc.ca/ http://cs-sun1000-1.mty.itesm….ews/get/groupware/bates1.html

Bates, T. (1996). The Impact of Technological Change on Open and Distance Learning. Presented at Queensland Open Learning Network, Brisbane, Queensland, Australia. http://bates.cstudies.ubc.ca/brisbane.html

Bennis, W. (1997). An Interview with Warren Bennis. Training, August 33-38.

Berge, Z. (1995). Facilitating computer conferencing: Recommendations from the field. Educational Technology, 35(1) 22-30.

Berge, Z. (1996). Theory and Research in DE. [Communication from Berge – CMC in Education] http://www.umbc.edu/lists/educ643/1996-2/0058.html

Berryman, S.E. (1995). Designing effective learning environments: Cognitive apprenticeship models. Cognitive Science: Challenging Schools to Design Effective Learning Environments. Columbia University, New York.

Blanchette, J., Collett, D., Goodale, C, & Kanuka, H. (1999). Learning Technologies in Distance Education. Office of Learning Technologies: Human Resources Development Canada. Online http://olt-bta.hrdc-drhc.gc.ca/projects/completed/NPLT/69032final_e.pdf

Boettcher, J. (1999). Pedagogy and learning strategies. http://www.andragogika.cz/learn_s.htm

Booth, W. C., Columb, G. G., & Williams, J. M. (1995). The Craft of Research. Chicago: The University of Chicago Press, pp. 85-146

Broad, M.L., & Newstrom, J.W. (1992). Transfer of training. Reading. MA. Addison-Wesley Publishing Company, Inc.

Bruner, J. (1999). Constructivist Theory. http://www.gwu.edu/~tip/bruner.html

Burgess, G., Zeitz, L., & Bin Aris, B. (2002) Applying adult learning concepts to technology integration at University Technology Malaysia. http://www.ettc.assurams.edu/Articles/itearticle.htm

Callaway, R., Matthew, K., & Letendre, C. (2002). Professor's reflections on changes implemented after technology professional development sessions. Proceedings of the Society for Information Technology and Teacher Education, USA, 1. 1532-1535

Carbonaro, M., Snart, F., & Goodale, C. (2001). Faculty professional development program. Proceedings of the Society for Information Technology and Teaching Education, USA, 1. 638-640.

Cegles, K. (1998). Emerging issues affecting distance education research and practice in higher education: A global futures perspective. http://wwwlib.umi.com/disserations/fullcit?82177

Cellante, D. (2002). How to effectively integrate technology into the curriculum—Through faculty development. Proceedings of the Society for Information Technology and Teacher Education, USA, 1. 623-625

Chadwick, T. (2001). How to conduct research on the internet. InfoQuest! http://www.tbchad.com/resrch.html

Cheng, H., Lehman, J., & Reynolds, A. (1992, November). What do we know about asynchronous group computer-based distance learning? Educational Technology, 31(11), 16-19.

Chernish, W. (2002). Developing faculty to move from classrooms to learning spaces. Proceedings of the Society for Information Technology and Teacher Education, USA. p. 630-631.

Chizmar, J., & Williams, D. (2001) What do faculty want? Educause Quarterly. # 1, Spring 2001. http://www.ilstu.edu/~jfchizma/

Coldeway, D.O., MacRury, K., & Spencer, R. (1980). Distance education from the learner's perspective: The results of individual learner tracking at Athabasca University. REDEAL research report #10. Athabasca University. [259 228]

Cranel, G. (1997). Practical Considerations for Instructors of Distance Education via Television. http://www.ihets.org/distance_ed/fdpapers/1997/crane.html

Crawford, R. (1998). Teaching and learning IT in English state secondary schools – Towards a new pedagogy? http://www.btinternet.com/~R.A.Crawford/ITPED.HTM

Cuffman, D. & MacRae, N. (2001). Faculty development Programs in Interactive Television. (ED400806) http://www.mtsu.edu/~itconf/96/cuffman.html

Denscombe, M. (1998). The good research guide: for small-scale social research projects. Open University Press.

Dutt-Doner, K., Larson, D., & Broyles, I. (2001). The challenge of developing college wide technology standards. Proceedings of the Society for Information Technology and Teacher Education, USA.1. 651 656.

Ehrmann, S. (1998), Engines of inquiry: Asking the right questions: What does research tell us about technology and higher learning? Technology & Learning. http://www.georgetown.edu/crossroads/guide/ehrmann.html

Ellsworth, J. (1997). Technology and change for the information age. Vision, 10/97. http://horizon.unc.edu/TS/vision/1997-10.asp

Egan, M.W., Sebastian, J., & Welch, M. (1991, March). Effective television teaching: Perceptions of those who count most...distance learners. Proceedings of the Rural Symposium, Nashville, TN. (ED 342 579)

Fales, A. & Burge, E. (1984). Self-direction by design: Self-directed learning in distance course design. Canadian Journal of University Continuing Education, 10,1,68,78.

Falk, J., Lochhead, J., Jacobs, G., & Mooney, B. (1997). TEECH lessons learned: Strategies for facilitating communication in teacher enhancement. Online http:www.coe.uh.edu/insite/elec_pub/HTML1997/fd_falk.htm

Feenberg, A. (1999). Whither educational technology. Peer Review, 1(4). http://www-rochan.sdsu.edu/faculty/feenberg/peer4.html

Fidishun, D. (2000). Andragogy and technology: Integrating adult learning theory as we teach with technology. Penn State Great Valley School of Graduate Professional Studies. Malvern, PA. http://www.mtsu.edu/~itconf/proceed00/fidishun.htm

Fulford, C. & Zhang, S. (1993). Perceptions of interaction: The critical predictor in distance education. The American Journal of Distance Education, 7(3) 8-20.

Gagnon, G., & Collay, M.(2002). Constructivist Learning Design. Http://www.prainbow.com/cld/cldp.html

Garrels, M. (1997). Dynamic Relationships: Five Critical Elements for Teaching at a Distance. Distance Alternative Education http://www.ihets.org/distance_ed/fdpapers/1997/garrels.html

Gay, G. (1997). Using Research to Design Effective Distance Education. Ontario Institute for Studies in Education (OISE). http://www.oise.utoronto.ca/~ggay/distance.htm

Geary, D. J. (1998). Perceptions of Instructor-student Interaction as a Reason for Persistence in Two-way Audio and Visual Distance Education. http://wwwlib.umi.com/dissertations/fullcit?69801

Gehlauf, D., Shatz, M., & Frye, T. (1991). Faculty perceptions of interactive television instructional strategies: Implications for training. The American Journal of Distance Education, 5(3) 20-28.

Gibson, S., & Nocente, N. (1998). Addressing instructional technology needs in faculties of education. Alberta Journal of Educational Research, 44(3), 320-31

Goodale, C., Snart, F. & Carbonaro, M. (2002). Faculty of education staff development—Support of tomorrow's teachers. Proceedings of the Society for Information Technology and Teaching Education. USA p. 634-638.

Goodale, C., Snart, F., & Carbonaro, M. (2002). Technology drives learning—Learning never ends. Professional Development Needs of Faculty. Proceedings of the Society for Information Technology and Teaching Education. USA. p. 632-633

Guzman, N. (2000). Applications of Adult Learning Theories to Constructivist Learning Environments. http://web.uccs.edu/bgaddis/leadership/topicfocus2D1.htm

Hardy, D. W. & Olcott, D., Jr. (1995). Audio teleconferencing and the adult learner: strategies for effective practice. American Journal of Distance Education, 9(1) 44-60.

Hein, G. (1991). Constructivist learning theory. Exploratorium: Institute of Inquiry, 1-8 http://www.exploratorium.edu/IFI/resources/constructivistlearning.html

Heinzen, T, & Alberico, S. (1990). Using a creativity paradigm to evaluate teleconferencing. The American Journal of Distance Education, 4(3) 3-12.

Hillman, D., Willis, D., & Gunawardena, C. (1994). Learner-interface interaction in distance education: an extension of contemporary models and strategies for practitioners. The American Journal of Distance Education, 8(2), 30-42.

Hoepfl, M. (1997). Choosing qualitative research: A primer for technology education researchers. Journal of Technology Education, 9(1) 1-17 http://scholar.lib.vt.edu/ejournals/JTE/jte-v9n1/hoepfl.html#waetjen

Huff, M. T. (1998). A Comparison of Critical Thinking in an Interactive Television Social Work Course (Distance Education). http://wwwlib.umi.com/dissertations/fullcit?207929

Models of Distance Education: A conceptual planning tool developed by University of Maryland University College for the University System of Maryland Institute for Distance Education. (1997). Institute for Distance Education. http://www.umuc.edu/ide/modlmenu.html

Johnson, D. (1995). Will our research hold up under scrutiny? Journal of Industrial Teacher Education, 32(3), 3-6.

Kanuka, H, & Anderson, T. (1999). Using Constructivism in Technology-Mediated Learning: Constructing Order out of the Chaos in the Literature. Radical Pedagoy: 1,2 http://www.icaap.org/iuicode?2.1.2.3

Kearsley, G. (1997). A guide to online education. http://www.gwu.edu/~etl/online.html

Kearsley, G. (2000). Constructivist Theory. http://www.gwu.edu/~tip/bruner.html

Kelly, M. (1990). Course creation issues in distance education. In R. Garrison & D. Shale (Eds.), Education at a distance: From issues to practice (pp. 77–100). Malabar, FL: Peter E. Krieger.

King, K. (2000). Educational technology that transforms: Educators' transformational learning experiences in professional development. AERC Proceedings. http://www.edst.educ.ubc.ca/aerc/2000/kingk-web.htm

Knowlton, D. & Nelson, W. (2002). Faculty development by design. Proceedings of the Society for Information Technology and Teaching Education, USA, (1) 85. (666-668 on CD).

Kochery, T. (1997). Distance Education: A Delivery System in Need of Cooperative Learning. ED 409847 http://ovid.library.ualberta.ca/Uapac/ovi…&R=10&totalCit=33&d=eric&S=AIPPPPOPNHANDL

Kruh, J., & Murphy, K. (1990). Interaction and Teleconferencing: The Key to Quality Instruction. Paper presented at the Annual Rural and Small Schools Conference. Manhattan, KS. Eric Document Reproduction Service, ED 329418

Lane, C. (1996). The role of technology in the systemic reform of education and training. Ed Journal, 1994, 8(6) 1-22, or Distance Learning Resource Network (DLRN). http://www.wested.org/tie/dlrn/reformtechpart1.html

Lee, C. (1998). The adult learner: Neglected no more. Training, 3 47-52.

Lougee, C. (2001). Technology, scholarship, and humanities: The implications of electronic information. The professional implications of electronic information. 1993, updated June 7, 2001. 2002 Coalition for Networked Information. http://www.cni.org/docs/tech.schol.human/Lougee.html

Maloy, W., & Perry, N. (1991) A navy video teletraining project: Lessons learned. The American Journal of Distance Education, 5(3) 40-49.

Mandefrot, K. (2001). An embarrassment of technology: Why is learning still difficult? Journal of Research on Computing in Education, 33(5). Retrieved December 20,2001from http://www.iste.org/jrte/33/5/mandefrot.html

Marquardt, M., & Kearsley, G. (1999). Technology-Based Learning: Maximizing Human Performance and Corporate Success. St. Lucie: New York

Martin, R. (1997). Constructivism and transformative learning theories. Construction and Adult Education. http://www.inspired/inside.com/learning/Construct/1-warmupl.htm

McEldowney, P. (1995). Scholarly electronic journals - Trends and academic attitudes: A research proposal. Department of Library and Information Studies, University of North Carolina, Greensboro, US. http://www.people.virginia.edu/~pm9k/libsci/ejs/htm

McFarland, T. W. Assessment of an Internet Training Program for distance Education Adjunct Faculty. Ed418698

Moore, M. (1993). Is teaching like flying? A total systems view of distance education. The American Journal of Distance Education, 7(1) 1-10.

Moore, M., & Kearsley, G. (1997). Study Guide for Distance Education: A Systems View. http://www.gwu.edu/~et/deguide.htm http://home.sprynet.com/~gkearsley/deguide.htm

Morales, M. (1999). Teacher professional development. http://homepages.go.com/~marianne_m/ProD1.html

National Council for Accreditation of Teacher Education (NCATE). (2001).

Norum, K. (1997). Lights, camera, action! The trials and triumphs of using technology in the classroom. Journal of Technology and Teacher Education 5 (1) http://www.aace.org/pubs/jtate/v5n1.html

Norum, K. (1999) A distant monologue. Educational Technology & Society 2(4). http://ifets.ieee.org/periodical/vol_4_99/karen_norum.html

Olcott, D., Jr. & Wright, S. J. (1995). An institutional support framework for increasing faculty participation in postsecondary distance education. The American Journal of Distance Education, 9 (3), 5-17.

Osborne, R., & Lafuze, J. (1997). Team Teaching a dual-Site Interactive Video Course: trails, Tribulations, and Triumphs. http://www.ihets.org/distance_ed/fdpapers/1997/osborne.html

Pedretti, and Woodrow. (1999). Teaming technology enhanced instruction in the science classroom and teacher professional development. Journal of Technology and Teacher Education, 7(2) 1131-143.

Peebles, C., Stewart, C., Bernbom, G. & McMullen, D. (2000) Research and Academic Computing Implementation Plan: A Comprehensive Plan for Information Technology in support of Research and Scholarly Accomplishment at IU. Indiana University. http://www.indiana.edu/~rac/stplan.html

Powers, S. (1997) Using the Medium to Teach the Media: Reflections and Lessons Learned. http://www.ihets.org/distance_ed/fdpapers/1997/powers.html

Quality Distance Education Project (QDE): Lessons Learned Evaluation Summary of Formative & Summative Data Collected November 1995 – May 1996. http://www.uwex.edu/disted/qde/eval.htm

Ramakrishna, (1999). Management of distance teaching institutions: The staff development perspective. World Bank Global Distance Educationet. http://wbweb4.worldbank.org/DistEd/Management/Operations/fac-02.html

Raymond, F. (1998). A comparison of critical thinking in an interactive television social work course. Online http://wwwlib.umi.com/dissertations/fullcit?207929 SEE HUFF IT'S THE SAME

Reigeluth, C. (1994). Introduction: The imperative for systemic change. In C. Reigeluth & R. Garfinkle (Eds.), Systemic change in education (pp. 3-11) Englewood Cliffs, NJ: Educational Technology in Publications.

Rockwell, S. K. (1998) Research and Evaluation Priorities for Distance Education in Nebraska: A Delphi Study. [White paper Distance Education Action Team.] Nebraska Network (Nov 21). http://homepages.go.com/~nn21/krockwell/fulltext.html

Rogers, P. (2001). Traditions to transformations: The forced evolution of higher education. Educational Technology Review, 9(1)1-15. http://www.aace.org/pubs/etr/issue1/rogers.cfm

Rogers, D. (2000). A paradigm shift: Technology integration for higher education in the new millennium. Educational Technology Review, Spring/Summer 19-33.

Ross, T. & Taylor, R. (2002). Faculty development training time: 96 is not enough. Proceedings of the Society for Information Technology and Teaching Education, USA, 1. page 1750

Rudestam, K., & Newton, R. (1992). Surviving Your Dissertation. Sage. CA

Russell, T. (1997). The "No significant difference" phenomenon as reported in 248 research reports, summaries & papers. North Carolina State University. 4th Edition.

Schlosser, C.A., & Anderson, M.L. (1994). Distance education: A review of the literature. Ames, IA: Iowa Distance Education Alliance, Iowa State University.(ED 382 159)

Schmidt, W. (1997). World-wide web survey research: Potential problems, and solutions. Behavior Research Methods, Instruments & Computers, 29(2), 274-279.

Selwyn, N. & Robson, K. (1998). Using e-mail as a research tool. UNIS Sociology at Surrey Social Research Update. p. 1-7 http://www.soc.surrey.ac.uk/sru/SRU21.html

Sheldon, E, & Lawrence, N. (1997). Terrors, errors and prayers: The trials, tribulations, and triumphs of teaching on television. Indiana State University. http://www.ihets.org/distance_ed/fdpapers/1997/sheldon.html

Sherry, L. (1996). Issues in distance learning. International Journal of Educational Telecommunications, 1(4), 337-365. http://www.cudenver.edu/public/education/sherry/pubs/issues.html

Siantz, J., and Pugh, R. (1997). Using interactive video for instruction. Indiana University Online http://www.ind.net/IPSE/fdhandbook/uiv/html

Snart, F., Carbonaro, M., & Goodale, C. (2001). Technology needs of university teachers, classroom teachers, and pre-service teachers: How do we begin? Finding the Courage to Teach in a Changing World. Western Canadian Association for Student Teaching Conference. University of Calgary. 2001.

Stetson, R., & Bagwell, T. (1999). Technology and teacher preparation: An oxymoron? Journal of Technology and Teacher Education 7(2).

Szabo, M., Anderson, T., & Fuchs, A. (1999). Report on a change system: The training, infrastructure and empowerment system (TIES); Proceedings of the Society for Information Technology and Teacher Education, USA, 1. 97-99

Taylor, S. (1997). Cooperative Learning in Distance Education Ivy Tech State College, South Bend, IN http://www.ihets.org/learntech/distance_ed/fdpapers/1997/taylor.html

Teaching for Understanding: Educating Students for Performance. (1996). Wisconsin Education Association Council. http://www.weac.org/resource/june96/under.htm

Thach, L. & Murphy, K. L. (1994). Collaboration in distance education: From local to international perspectives. The American Journal of Distance Education, 8(3):5-21.

Thach, E., & Murphy, K. L. (1995). Competencies for distance education professionals. ETR&D 43(1) 57-79.

Thoms, K. (1999). eED400805 Ethical Issues relating to Teaching via an Interactive two-way television System.

Tothill, A., Lock, B., Karelse, C., Houston, C., Chili, K., Parker, L., Himuchul, L., Nassimbeni, M., & Petros, N. (2001). Start your research – Research methodology. Yenza! http://www.nrf.ac.za/yenza/research/internet.htm

University of Alberta. (2001). Online http://www.quasar.ualberta.ca/edit202/team202.htm

Warren, R. (1995). Needs of distance learners. [On-line]. http://www.att.com/cedl/needs.html

Wellburn, E. (1996). The status of technology in the education system: A literature review. Community Learning Network. http://www.cln.org/lists/nuggets/edtech_report.html

Willis, B. (1995). Distance education at a glance. Engineering Outreach. College of Engineering, University of Idaho. http://www.uidaho.edu/evo/dist2.html

Willis, B. (1997). Strategies for Teaching at a Distance. http://www.uidaho.edu/evo/dist2.html

Willis, B. (1998). Effective distance educational planning. Educational Technology, 38(1), 57-58.

Wilson, S., & Berne, J. (1998). Teacher learning and the acquisition of professional knowledge: An examination of research on contemporary professional development. Review of Research in Education, 24, 173-206.

Wolcott, L. (1993). Faculty planning for distance teaching. The American Journal of Distance Education, 7(1) 26-36

Wolcott, L. L. (1998). Faculty Issues Pertaining to Institutional Support and Reward Practices in Distance Education. Paper presented at the annual conference of the American Educational Research Association, San Diego, CA. (ERIC Document Reproduction Service No. ED 419 530).

Yarkin-Levin, K. (1983). Anticipated interaction, attribution, and social interaction. Social Psychology Quarterly, 46(4), 302-311.

APPENDIX A - INTERVIEW GUIDE (EXAMPLE)

Professional Development in Technologies
Faculty of Education

- ❖ **COMMUNICATION**
- ❖ **TEACHING/LEARNING**
- ❖ **RESEARCH/WRITING**
- ❖ **PROFESSIONAL DEVELOPMENT**
- ❖ **TECHNOLOGY**

❖ COMMUNICATION

Please think about the use you presently make of technology in your communications.

Do you use technology as a communication tool?

	What tools do you use now to communicate?	*What tools are you considering using in the future?*
With students regarding course related activities		
With students regarding non course activities		
With graduate students you supervise		
With administrative staff		
With colleagues and professional contacts		
For file transfer		
For other reasons		

❖ TEACHING/LEARNING

Please think about the use you presently make of technology in your day-to-day teaching processes.

Please describe the various technologies that you use and how you use them.

	What tools do you use now?	*How do you use these tools such as combining with teaching/ learning strategies?*	*What tools are you considering using in the future?*	*How would you use these tools in the future such as combining with teaching/learning strategies?*
Planning / Designing				
Teaching / Learning				
Student assessments				
Instructional management				
Other				

How did you learn each tool or technology you are currently using and how did it work out?

How did you hear about each tool or technology?
How did you learn each tool or technology?

When trying out the technologies or tools what worked well for you?
When trying out the technologies, what did not work out so well?

In what context do you use technology to facilitate course delivery such as WEB CT?

To supplement traditional course delivery?
To deliver entire courses?
To deliver courses as part of a distance delivered program?

Do you teach technology content within any of your present courses?

	What tools do you use now?	*What tools are you considering using in the future?*
Core technical skills		
General pedagogical skills		
Subject specific pedagogical skills		
Distance education skills		
Impacts of technology on society		
Other		

❖ RESEARCH/WRITING

Please think about the use you presently make of technology in your own research and writing.

What types of research designs do you usually use?

Qualitative?	
Quantitative?	

To what extent, and in what ways, do you use technology to assist you in research and writing?

	What tools do you use now?	*What tools are you considering in the future?*
Searching for information		
Data gathering		
Data analysis		
Writing or Editing		
Publishing		
Dissemination		
Other		

What research projects are you currently involved in that focus on the use of technology in Education?

Research/writing/projects involving technology?	Other?

❖ COMMUNITY AND PROFESSIONAL SERVICE

Do you use technology to assist in community or professional service activities?

Service in your community
Service in your profession
Other

❖ PROFESSIONAL DEVELOPMENT

Please think about the use you presently make of technology in your professional development.

What type of professional development activities are you currently accessing in general?	Through what means are you accessing these activities?
Specifically – professional development activities you are currently accessing to learn more about technology?	Through what means are you accessing these activities?

What type of professional development opportunities do you feel you need in the future to learn new skills or enhance your skills?	Through what means would you like to participate in professional development opportunities? HOW would you like professional development for technologies implemented for you to learn or enhance your skills?

What roadblocks or deterrents might prevent you from involvement in professional development?

❖ TECHNOLOGY

What technical support tools and services would be of value to you?

What technical support tools should the faculty provide to assist you with the use of technology?
What technical support services should the faculty provide, thus removing the need for you to develop skills in this area?

What equipment / peripherals / software / other equipment do you have now?

Future use of technology

Please mention ways that you think the faculty, and faculty members, could make use of technology in the future.

❖ PARTICIPANT COMMENTS

Are there any topics that we did not cover that you thought we would cover? We could add topics now.
Your comments please.

❖ DEMOGRAPHICS

Academic position, years at university		
General area of instruction, subject area		

APPENDIX B - INVITATION/CONSENT FORM (EXAMPLE)

Participant:
Re: Professional Development in Technology (Faculty of Education)

As indicated in a recent memo to faculty, you are invited to participate in this interview study as an initial response to the professional development needs of faculty members integrating technology into teaching, learning and research.

As the process of integration of technologies continues to rapidly evolve, faculty members need a faculty wide climate of support. Supporting the professional development needs of faculty members to integrate technology into teaching, learning and research impacts directly and indirectly current and future administrators, teachers and their students. Professional development opportunities to integrate technologies are intended to meet the needs of faculty members and subsequently the professional community they serve.

The purpose of this study is to investigate the professional development needs of faculty members integrating technology; and the following questions serve as a guide to the investigation.

- What do faculty members need to make technology an integral part of their teaching and learning process?
- What do faculty members need to enhance delivery of instruction, and to facilitate development of knowledge, skills, and abilities, including problem solving and critical thinking?
- What do faculty members need to integrate technology into all aspects of the research process including access to information, collection of data, analysis of data and dissemination of results?

Your participation in this study is important to expand the ability to address the professional development needs of faculty with respect to technology integration. To collect data, a qualitative approach in the form of interviews will be used. It is anticipated that the interview will be 45 minutes in duration. Although you will be contacted to confirm that you are in receipt of this invitation, do not hesitate to call or write to schedule an early appointment.

- Contact person to set up interviews
    - Cheryel Goodale
    - Telephone 428 1080, Pager 491 1197 E-Mail cgoodale@ualberta.ca
    - Flexible appointment times between 6:30 am – 7:30 pm, Monday – Saturday

---

- As a participant, you will be asked to sign this consent form to participate.
- You will have the right to refrain from answering any particular questions, and you will have the right to opt out of the research at any time without penalty.
- Processes to provide accuracy of data, security, confidentiality are implemented in the design of the study. A technical recording device will be used to ensure accuracy of data collected from interviews. Security and confidentiality measures will be implemented, including the backup of data, secure storage of tapes, and plan for deleting electronic and taped data. Only key researchers will have access to data/information. To ensure confidentiality, alternate names/numbers will be used.
- There is no perceived threat or harm to participants or others through the study.

Consent to Participate – Professional Development in Technology Study

Participant's Name Date:

Researcher's Name Date: